REPORT RESUMES

ED 003 739 64
INSTRUMENTATION FOR INSTRUCTION, 1955-70, VOL. 2--TEXT.
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NATIONAL EDUCATION ASSN., WASHINGTON, D.C.
REPORT NUMBER NDEA-VIIB-069-2 PUB DATE 60
EDRS PRICE MF-$0.27 HC-$5.20 130P.

DESCRIPTORS- *EDUCATIONAL EQUIPMENT, *AUDIO EQUIPMENT, EQUIPMENT, *AUDIOVISUAL AIDS, *TAPE RECORDERS, EDUCATIONAL TELEVISION, INSTRUMENTATION, LEARNING LABORATORIES, DISTRICT OF COLUMBIA, TECHNOLOGICAL DEVELOPMENT PROJECT

THE ROLE OF EQUIPMENT IN THE NEW TECHNOLOGIES OF INSTRUCTION WAS EXPLORED. SOUND EQUIPMENT, EDUCATIONAL TELEVISION EQUIPMENT, AND LEARNING LABORATORIES WERE DESCRIBED. OTHER VOLUMES IN THIS SERIES ARE ED 003 738 THROUGH ED 003 746. (JK)

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IV

SOUND EQUIPMENT

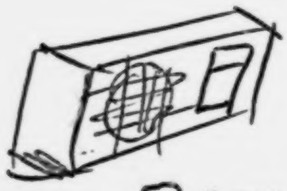
A. INTRODUCTION

Sound equipment is here considered to include the telephone, public address system, intercom, record players, radio, tape recorder, and all other methods of recording, transmitting, and/or reproducing sound either separately, or in conjunction with picture, where ~~it is~~ used for educational purposes.

Sound equipment has been introduced into the schools gradually since the beginning of the century. There has been no great impact or explosive growth, yet radio receivers and record players now collectively outnumber the total of projectors of all kinds in use in the U.S. Public Schools. Whether this reflects the early introduction of sound equipment for home use, the orientation of teachers to verbal rather than visual methods of communication, or some superiority of the verbal medium, is left for the speculation of the reader. Certainly sound equipment is important for the reproduction of recorded music and speech, and the equipment of its very nature is simple and easy to use.

1. Purpose.

Sound equipment is used for the recording, transmission, and reproduction of music, voice, real-life events, and dramatized presentations in the classroom. It is used for teaching musical appreciation, provides rhythm backgrounds for dance, games, and gymnasium exercises, and also lends itself to readings, historical re-enactments, and the dramatization of history and literature. Public address systems serve to amplify sound; inter-com units facilitate two-way communication. Radio permits the immediacy of on-the-spot reports of newsworthy events, and facilitates the dissemination of specially prepared program materials. Records, and particularly tape recorders which have the facility for recording and immediate playback, are invaluable for teaching language skills, and are widely used for teaching speech and foreign languages. Sound is also an adjunct to film and television presentations, and usually carries the



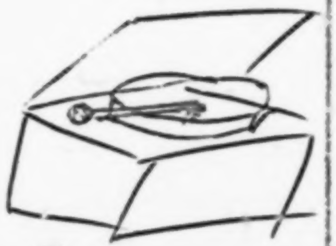
RADIO

bulk of information to be learned despite the great power of the visual media.

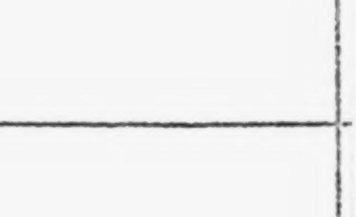
2. History.

The phonograph was originated by Thomas Edison in 1877, and the telephone by Alexander Graham Bell in 1884. Both media have had an enormous impact on modern day living, but the adoption of the telephone as an educational medium has been as slow as the phonograph has been spectacular. Radio, discovered by Marconi in 1895, was first used for voice transmission by Fessenden in 1906. The invention of the thermionic amplifier tube in 1906 paved the way for radio receivers and record players as we know them today.

sketch **a. Radio.** The first radio broadcast license was issued in the U.S. in 1920, and this also marked the beginnings of educational radio. A number of colleges and school systems had broadcasting stations in the 20's and 30's, but until the mid 30's there was not a sufficient number of radio receivers in the schools for it to be significant as a classroom tool. Meanwhile the advent of commercial radio caused a decline in



RECORD
PLAYER



TAPE
RECORDER

the sales of records for home use, so that some of the recording companies began to turn their attention to education as a possible market. The introduction of commercial radio may also have caused a number of discarded phonographs to find their way into the schools.

Sketch b. Record Players. The early mechanical phonographs did not produce sufficient sound for a class of 30 or 40 students, but the introduction of electronic amplifiers and improved methods of recording led to increased use in schools. The introduction of microgroove recordings in 1947, and stereophonic sound in the 1950's brought about further improvement in the quality of sound reproduction. Equipment was also becoming smaller and less costly, and the utilization in schools continued to increase.

Sketch c. Tape Recorders. Magnetic recording was introduced in 1936, but tape recorders suitable for school use did not become available ~~till~~ until about 1950. This tool has been rapidly accepted by the teaching profession, meeting a long felt need for a simple recording instrument with immediate playback. It may be used to store program materials from radio and television, and to record classroom activities for later use. It has proved especially useful for teaching language skills and correcting speech defects, and has become the basis of the electronic learning laboratory.

d. F.M. Radio. Meanwhile, FM radio was introduced in 1935, and ten years later 20 of the 100 existing channels were allocated for educational use. Educational radio was in its heyday as a classroom medium in the 30's, 40's, and early 50's, but the advent of educational television has led to its decline and even replacement in some areas.

e. Public Address Systems. Public address systems assume several different forms. Portable systems are used for special assemblies and outdoor meetings, such as graduation. Auditorium units amplify speakers and performers for large indoor audiences. Classroom communication systems allow the principal to make announcements to any classroom, or to broadcast in programs from radio and other sources.

Sketch **f. Inter-Com.** Intercommunication systems allow two-way communication, and may be incorporated into classroom communication systems~~,~~ or be used only for inter-office communication In essence, they serve the same function as the telephone.

Sketch **g. Telephones.** Many classroom teachers now have the benefit of a telephone on their desk for intercommunication purposes within the school. This saves a considerable amount of time and effort for the teacher locating and ordering materials, ~~in~~ communicating with other teachers, and ~~in~~ asking for assistance whenever it is desired.

SR **h. Sound and Pictures.** Sound is often used in conjunction with films, filmstrips, slides, and television. ~~and~~ When sound is synchronized with pictures, each may reinforce~~s~~, the other. ~~Used jointly they are~~ To produce a more powerful and versatile communication tool than either used separately. Sound films and television have been subjected to considerable research in recent years, and when properly used are among~~st~~ the best teaching media at our disposal.

Fig. [illegible] Audiometer to test hearing loss. (Bausch & Lomb)

~~Does this belong here~~

C. TRENDS AND DEVELOPMENTS SINCE 1955

The developments since 1955 have been many and varied. The classroom use of tape recorders has grown rapidly. ~~while~~ ~~at an enormous rate, and~~ The language laboratory has undergone growth unprecedented in the history of instructional technology. Equipment has been miniaturized + reliability increased. ~~beyond recognition in many instances, while~~ Both disc and tape recordings have ~~been~~ improved in fidelity and ~~in their~~ information carrying capacity. As with projection equipment, there has been a great emphasis on user convenience, giving rise to cartridge loading ~~for~~ tapes, with remote control, indexing devices, random access, and numerous other features. ~~Stereophonic sound has been introduced on both tapes and disc, and reliability of the equipment has been greatly increased.~~ improved. ~~There has been a strong trend toward~~ The use of sound for individual instruction is evidenced by the development of "listening corners" ~~in many classrooms,~~ and the advent of the language lab.

1. Listening Corners.

SK Many classrooms now have listening posts as part of a study corner in the classroom. Study corners have been used under various names for some years as a means of keeping students who finish their class assignments ahead of time usefully employed. Initially these units contained only books and puzzles, but since many elementary classrooms already had a record player, it was a simple matter to provide a junction box for earphones, allowing one or more students to listen to a record without disturbing the remainder of the class. The study corners have also been supplied with filmstrip viewers and other audio-visual devices in some instances.

2. Tape Recorders.

Specific makes of recorders will not be discussed in this section since tape recorders have been in use since about 1950, and most readers will be familiar with their characteristics and mode of operation. There have been some general trends and changes which will be briefly noted here. Initially the recorders designed for school use recorded 7½ inches of tape every second, but improvement in tape and tape players has enabled this to be reduced successively to 3 3/4ips and 1 7/8ips. ~~so that~~ economy in tape and storage is thus achieved, and the playing time of a reel of tape ~~has been~~ is quadrupled. Tape has also been increased in strength so that breakage, a serious problem in the early days, has been almost entirely eliminated. Thinner bases to hold the magnetic coating have allowed up to ~~50%~~ 100% more tape to be loaded on a single reel, and changes from ① one to ② two to ④ four tracks on a ¼" tape width ~~of tape~~ has, likewise, further increased its storage capacity. The net~~t~~ result is that sixteen times as much information can now be recorded on a given length of tape, or ~~twentyfour~~ thirty-two times the information can be stored on a single reel ~~and still produce~~ with comparable if not better quality than was possible ten years ago.

Many new features have been added to tape recorders ~~to make use simpler and more convenient~~, including footage counters to facilitate location of specific items of the tape, and automatic stop at the end of the reel. A number of companies have also adopted cartridges of various kinds to simplify loading of the tape.

a. Tape Cartridges. As with film cartridges in the previous chapter, there are two major types; reel-to-reel flip-over types which rewind themselves in the process of playing the second side, and continuous loop varieties.

(1) Reel-to-reel cartridges are used on equipment

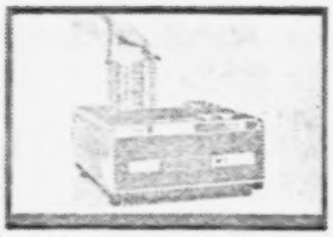


Fig. 138 New cartridge tape recorder for home use uses 1/7 inch wide tape running at 1 7/8 inches per second. Cartridges can be stacked on top of each other, and the machine rewinds and rejects each cartridge as it is played. 450 feet of tape plays 45 minutes of stereo music

manufactured by Gelosol (201), ~~Magnaticon~~ Thompson Ramo Wooldridge, (253), Langua Labs X X and Radio Corporation of America (229), and feature automatic stop at the end of each reel. Another variety used in several dictation machines, and recently redesigned for use in the 3-M Revere tape recorder (138), houses only one reel within the cartridge, and the recorder itself has the take-up reel.

Caption

This particular unit uses a new type low noise tape, which gives a full range of frequencies at 1 7/8 inches per second playing speed, stores 45 minutes of stereo music on a 450 ft length of 1/7" wide tape, and automatically rewinds at the end. ~~These~~ Cartridges can be stacked one on top of the other, and the tape player ~~is designed to~~ rejects each tape as it is played and automatically starts ~~on~~ the next, ~~so that~~ Fifteen hours of stereo music can be accommodated in a single loading.

(2) Continuous loop cartridges come in two basic types; one is an all-purpose unit which fits on any recorder but needs manual threading, the other is an integral unit which is simply plugged into the recorder mechanism. Cousino (176) and Television Associates of Indiana (249) manufacture the only varieties of the former presently available, while ~~[illegible] ([illegible])~~ ~~Conley Electronics~~

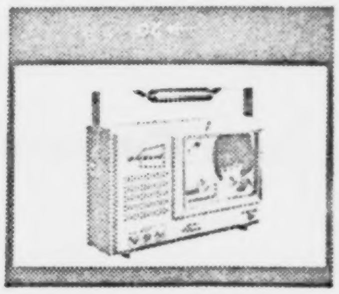


Fig. 139 Magnetic card player. A magnetic coating on the back of the card provides the sound to supplement pictures and printed information on the front. (Magnasync)

Cousino (175), KRS Electronics (216), ~~and~~ Mohawk Business Machines * * + Teleprompter (248) manufacture continuous cartridges of the integral type, for use on machines by Cousine (174), Jay (212), KRS (215), Mohawk, ~~( ), Pentron ( ), Picture Recording Co. ( ).~~ Reflection (233), and Science Electronics # #.

b. Magnetic Card Devices. Several years ago Bell ? & Howell experimented with a device which used a piece of magnetic tape attached to a card, on which was recorded a few words or a phrase which the student had to learn, perhaps in a foreign language. The device was perhaps ahead of its time, and the patents have now been sold to McGraw ? Hill * *. In the last few years the idea has reappeared in a different form as marketed ~~by in Japan ( ), and~~ by Magnasync (139). (~~Thompson Ramo Wooldridge are surveying the possibility of marketing the Japanese device here in the U.S.~~) These newer devices do not have a moving card as developed by Bell & Howell; the card remains stationary and a rotary scanner plays back the recorded information. Since the scanning side is away from the viewer, the opposite side can contain printed information and pictures, or even workbook type material to be filled in.

C. Special Tape Recorders for Language Teaching.

Specially modified recorders are advantageous for teaching spoken language skills so that master recordings can be used and re-used without danger of erasure. The student uses a separate area of the tape to practice his responses, and can then listen to the tape again and compare his responses with the model set up by the teacher. If he is not satisfied with his performance he can go back and repeat the excercise. This kind of recorder is available as a separate unit, or can be used in conjunction with language labs. ~~Bell & Howell ( ) have a~~ separate ~~recorder of this type, and others will be mentioned in conjunction with the language laboratories with which they are usually associated.~~

3. Electronic Learning Laboratories.

Better known as the language laboratory, this development is a direct outgrowth of listening corners, and the fact that language skills can be much more readily learned and monitored if the student can work singly rather than as a group. Language laboratories can be divided into four categories commonly called audio-passive (listen only), audio-active (listen and respond), audio-active-comparative (listen, respond, record and compare), and individual study (where each student has his own recorder and can proceed as he chooses.)

a. Audio-Passive. The record or tape player supplying several sets of earphones would represent an audio-active or a listen-only type of lab. Its real value compared to using a regular speaker system lies mainly in the elimination of outside noise and interference from room acoustics, and in eliminating the disturbance of amplified sound to neighboring classes. It also facilitates individual study (as in the listening corner) or allows groups to be working on different programs in the same classroom or study hall. Since almost any record player, tape recorder, or radio can fulfill this function, only those units of equipment especially designed for the purpose are included ~~will be mentioned~~ here. Such units are usually disc players, as manufactured by Audio-master ~~# #~~, Newcombe (224), Perry Company (225), and Rheem Califone ~~# #~~. ¶ It should be noted that since the following sections represent successive refinement of a basic idea, and the equipment of companies to be discussed later can also be used in an audio-passive mode.

b. Audio-Active. The necessity of speaking and listening for learning a speaking skill should not be underestimated, and the technological advantage of "hearing one's self speak" can save the teacher hours of explanation and personal attention. A variety of devices are used for this purpose~~, from~~ including a simple voice reflector as used by Cousino (173), ~~an~~ electrical feedback through earphones, ~~to~~ a recording facility which plays back a few seconds later as used by Reflection (232), ~~to~~ and a recording which is played back ~~in~~ seconds or minutes later under teacher control, or under individual student control.

In the audio-active lab the student receives the lesson from a record or tape player or hears the teacher directly, and since the student has a microphone to hear himself speak, the teacher can also "listen in" on his responses by turning a key on her console. This element of unexpectancy is a motivation to the student to ~~keep~~ work~~ing~~ well in addition ~~to~~ this allow~~ing~~s the teacher to appraise individual performances, a difficult task when the students are reciting as a group. Also, The teacher ~~is also enabled to~~ can talk back to any particular student without disturbing the remainder of the class.

Typical audio-active labs are manufactured by Aero-Service (143 and 144), Audio Teaching Center (152), AudioTronics (157), Black-Tronics (165), Switchcraft (242), and Universal (255). It should be noted that the use of a language lab type of tape recorder to present the lesson allows a limited comparative function to be added while still maintaining the equipment in a portable state so it can be used for other purposes.

C. Audio-Active-Comparative. These units may be portable or built into booth units, depending on the kind of application and the ability of the school to pay for the more elaborate facility. Booth units give a greater degree of sound insulation and physical isolation between students. Also, it is a step toward the more complex and flexible installations for completely individualized instruction.

The inclusion of a recording function enables the student to compare his performance with that of the master teacher. A conventional tape recorder allows only one student to be recorded at a time, while a multi-track recorder could record several or all of the students simultaneously if desired. Most audio-active-comparative labs have more than one playback machine so that several different programs can be taught in the same room simultaneously.

Units of this type are manufactured by American Desk (147), American Seating (150), Ed-U-Tronics (182), Electro-Educational Developments (186), Hoover (208), Instructomatic (210), Magnasync (219), Rheem Califone (234), RCA (226), Sigma (239), Stancil Hoffmann (240), Universal Electronics (256), Ultronics (258)* and Webster (268). Where booth units are used, it is a comparatively simple matter to make the final step to individual study booths, or to effect the compromise of several recorders and playback machines under the control of the teacher, which seems to work out very well in most instances.

d. Individual Study Booths. In stages 1, 2, and 3 above, it is a simple matter to diversify the number of programs being taught in one classroom by adding additional record players or tape recorders. Ideally there would be a tape recorder for every student so that students become self-pacing, and work independently. Thus, a student making unsatisfactory progress would be able to repeat lessons and work on additional materials rather than proceed prematurely. This removes many of the regimentation aspects of teaching, and the teacher is now monitoring students in many different stages of a program or even working on totally different programs. The real advantage lies with the student, since learning can be more thorough with this flexible scheduling arrangement.

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*Viking of Minneapolis (263), V-M (265)

Individual study labs are more costly, but it should be noted that it is not necessary to purchase a complete installation since, so long as the booths and wiring are present, additional recorders can be added later. Such labs are manufactured by American Desk (147), American Seating (150), Audio-Teaching Center (155), AV Electronics Inc. (159), Berlant (161), Bernco (163), Chester Electronics (167), Cook (170), Cousine (171), Dictaphone (177), DuKane (178), Edwards (183), Electronic Teaching Labs (190), Fleetwood Furniture (196), General Electric Co. (202), Electro-Solid Controls, Inc. (204), Hamilton Manufacturing Co. (206), Robert C. Merchant (220), Reflection Educational Products (230), Radio Corporation of America (227), Rheem Califone (235), Science-Electronics (237), Thompson Ramo Wooldridge (250), Universal Electronic Labs (256), U-tronics (258), Viking of Minneapolis (263), Voice of Music (267), Webcor (271), and Webster Electric Co. (273).

Fig. 149 Dial in language laboratories allow the student to work anywhere in the building, or even from a dormitory or sick-bed. In this way the facility is no longer limited to the confines of the classroom, and can be used outside of normal class hours. (Chester)

3. Automated Laboratories. Since with younger students, it is preferable to have the recorder remotely controlled, ~~and~~ a number of systems have been developed where the playback and recording mechanisms are housed in a cabinet separate from both the teacher and the student so that the same functions are achieved without cluttering either the teacher's or student's desk. In this kind of installation, the student has simply to push buttons on his desk to operate the record and ~~re~~play back facility. Several of the aforementioned units operate in this manner, while some can be obtained in either form. These include Berlant (161), Chester (168), Fleetwood (198), ~~[illegible]~~, and Science Electronics (237), ~~and Thompson-Ramo-Wooldridge ([illegible])~~.

4. Dial-in Systems. As the electronic switching functions increase in complexity, the desirability of simplification becomes more and more necessary. A single switch on a two- or three-wire circuit is limited in the number of functions it can perform. The use of a telephone type dial-in unit allows any desired number of switching functions, so that lesson selection, record or playback, and talking to the teacher are achieved using a single control, and

expansion of the facility to provide a wider range of programs or functions require no change in the classroom equipment. Similarly the very complex switchboards now used by the teacher could be replaced by a telephone dial. The only lab of this type in current use is manufactured by Chester Electronics (169).

g. Wireless Language Labs. A large part of the cost of setting up an electronic learning laboratory lies in the complex wiring and circuitry, In a few instances radio has been used as the communication link between teacher and student. Electronic Futures (188), Hargan, & Inductophone (209a) have developed ~~a~~ transistorized earphones powered by a tiny battery to receive signals from the teacher or master recording. ~~and~~ The Electronic Futures headset can be obtained in audio-active or audio-passive mode as required. A loop of wire around the walls of the room serves to broadcast the signal. Cook Electronics (170) have a wireless system for up to 40 students which facilitates two-way communication with the teacher, individual monitoring, talkback, and recording. Both of these systems have the advantage that they can be used in any ~~regual~~ regular classroom by providing each student with a head set, and the teacher with a control console.

h. Battery-operated recorders. Two companies manufacture battery-operated units which have most of the features of a regular lab. ~~GBC America~~ Geloso (201) has a recorder-playback unit similar in function to their dictating machine, but so designed that the master recording of the teacher cannot be erased, while the student can record, listen and compare as often as he pleases. The unit can be used with earphones or ~~using~~ the inbuilt speaker system. Electronic Futures (188) have developed a unit especially for language lab use. Wireless earphones receive information from the teacher as mentioned earlier, and each student has an "Audio-Notebook", a small battery-operated tape recorder which holds 5½ hours of learning material in convenient 15-minute segments. This system offers everything that the individual study lab provides excepting the isolation and sound proofing of booth units, and talk-back to the teacher. In return, however, there is a reduction of cost, and the units can be operated almost anywhere ~~such as a~~ including the study hall ~~or~~ and library, or even taken home if required for additional study.

i. Audio-Visual Language Labs. The integration of visuals with sound materials used in the electronic learning laboratories is being widely explored, using ~~and a range of approaches are being used from~~ films and filmstrips, ~~to~~ motion pictures, and even videotape. Both group and individual presentation are utilized. Slide and motion picture projectors can be added to any lab using the group mode of presentation. Introductory, motivational and demonstration films can thus be integrated with the lab so that immediate practice can follow. In laboratories designed for individual study, the use of individual film or filmstrips presentations would seem more appropriate, and it is here that the audio-visual units discussed on pages ____ would belong. These again could be described as audio-visual-passive, audio-visual-active, and audio-visual-active-comparative, depending on whether or not they had microphone and recording facilities to accompany them.

~~10~~j. Portable Trailer Labs. Several companies, including Edwards (276), Science Electronics (278), Rheem Califone (277), and Thompson Ramo Wooldridge (279), manufacture ~~are building~~ trailers to act as portable electronic classrooms. These units are not a gimmick to demonstrate and sell the equipment, but functional units which ~~are being used to~~ supplement existing classroom facilities. An example is the Harvard-Arlington van unit, which has ___ teaching stations.

K~~1~~. Some General Comments on Equipment Trends. Several recent developments make equipment more functional, including transistors, modular construction, and tape cartridges.

(1) Transistors. Although the use of transistors applies to all sound equipment, and is bringing about miniaturization and sweeping changes in the design, their mention here seems particularly appropriate. The problems of power consumption and heat from regular thermionic tubes ~~is~~ are largely ~~overcome~~ Solved, so that language laboratories do not require special ventilation to overcome the heat from a multitude of amplifiers. Special wiring of a room can be eliminated through the use of battery-powered transistorized equipment with radio for inter-com. Since the power consumption is very low, tiny rechargeable batteries, or throw away types if preferred, can be built into the equipment, and operate for up to a semester without attention. The reduction in size and weight enables a radio receiver and amplifier to be housed in a space little bigger than a regular earphone, or a tape recorder to be built smaller than a ~~regular~~ desk dictionary.

(2) Modular Construction. Electronic failure in a language laboratory is comparatively rare, and studies have been

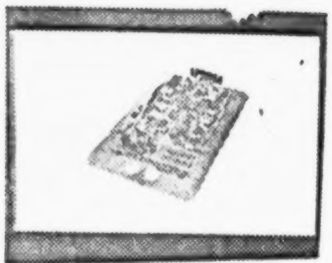

Fig. (141) Modular construction. Transistor amplifiers built ~~in~~ as plug in, modules are simple to service since a faulty unit can be replaced in an instant by the user. Modules simplify construction and maintainance, and many manufacturers are now adopting this approach. (General Electronic Control)

141a ANOTHER KIND OF MODULAR CONSTRUCTION USED IN A TV RECEIVER conducted to determine which components of the system are most likely to give trouble. Earphones seemed the most susceptible to damage, while tape recorders and wiring ~~were~~ are at fault much less often. Since a single problem can render a booth unit inoperative, designers have been called upon to build equipment which continues to operate at top efficiency. Most labs carry additional sets of earphones, and a few manufacturers have designed their recorder and amplifier units as modules which can be lifted out and replaced in the event of failure, ~~so that lab booths remain inoperative only for as long as it takes to~~ lift out ~~replace the faulty unit~~ and slide [illegible] spare. Science Electronics ( ) has plug-in amplifier panels for their equipment which can be changed in an instant. Other manufacturers are also considering such measures.

Caption — use pic.

(3) Tape Cartridges and Stacked Cartridge Systems. Cartridges were mentioned earlier in the section on tape recorders, but their use in language labs is already ~~much more~~ significant, because of the large number of program channels used in ~~most~~ many laboratories. Whether the recorders are operated by teachers, by students, or by remote control, cartridges eliminated the problems of threading. A number of special units for handling multiple

ELECTRONIC TEACHING LABORATORIES

	Audio-Passive	Audio-Active	Audio-Active-Comparative	Individual Study Booths	Automated Lab.	Dial-in Systems	Wireless lab.	Battery Operated Recordr	AV Language Labs	Portable Units	Mobile (Trailer) Units	Transistor Amplifiers	Modular Electronics $	Tape Cartridges	Furniture only.
Advance Products Co															X
Aero-Service		X	X							X					
Acoustron		X	X	X											
American Concertone			X	X											
American Desk			X	X											
American Seating			X	X											
Audio Teaching Center		X	X	X						X					
AudioTronics		X								X					
AV Electronics			X	X											
Berlant			X	X	X								X		
Ber nco				X											
Blacktronics		X								X					
Brunswick															X
Chester				X	X	X									
~~Conley~~															
Cook			X	X			X								
Cousino		X	X	X						X				X	
Dictaphone			X	X											
Duo Desk															X
DuKane			X	X					X						

~~Educational~~ Electronic Teaching Labs.			X	X						X					
Edutronics			X							X					
Edwards			X	X							X				
? ~~Electro Educational Developments~~															
Electronic Futures			X	X			X	X		X		X			
Emco			X	X											
Fleetwood			X	X	X										
Geloso			X	X				X		X					
General Electric			X	X											
Electro Solid Controls Inc ~~General Electronic Control~~			X	X								X			
Hamilton			X	X											
Hoover			X							X					
Howe															X
Instructomatic			X							X					
Jay			X							X					
Jentzen Miller															X
KRS Electronics			X							X					
Langua Lab			X	X										X	
Magnasync			X	X											
R.C. Merchant				X											
Newcomb	X									X					
Miller										X					X
Perry Co	X														
Radio Corp. of America			X	X						X					
~~Robert H. Redfield~~			~~X~~							~~X~~					
Reflection			X	X											
Rheem Califone	X	X	X	X						X			X		

Science Electronics				X	X						X		X		
Sigma				X						X					
Stancil Hoffman			X												
Switchcraft		X	X	X						X					
Tanberg			X	X											
Telectro			X	X											
Teleprompter														X	
Television Associates														X	
Thompson Ramo Wooldridge			X	X							X				
Universal Electronic Labs		X	X	X						X					
Utronics			X	X											
Viewlex		X								X					
Viking of Minneapolis			X	X						X					
Voice of Music			X	X						X					
Webcor			X	X											
Webster			X	X						X					
West Demster															X

TABLE 15

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1. Because of the rapid trend toward modular construction of amplifiers this list should not be considered upt to date in this regard.

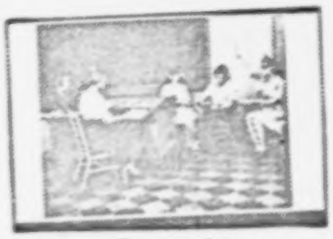
Acoustron

~~Ha Ad~~

ELECTRONIC LEARNING LABORATORIES (1)

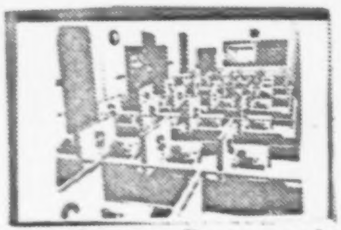
(142) Advance Products

(143) Aero Service

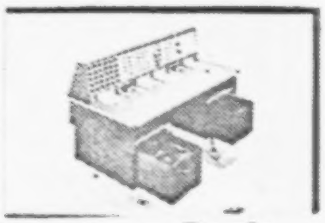


(144) Aero Service

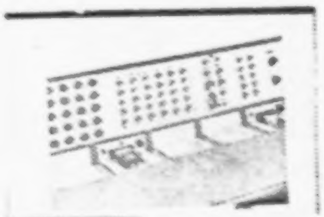
(145) American Concertone



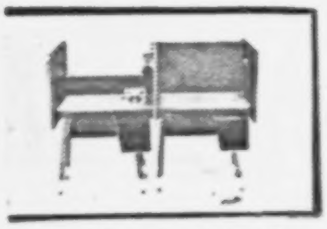
(146) American Concertone



(147) American Desk



(148) American Desk

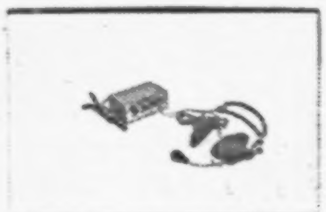


(149) American Desk

(150) American Seating

(151) American Seating

(152) Audio Teaching Center

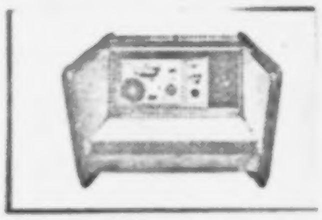


(153) Audio Teaching Center

(154) Audio Teaching Center

ELECTRONIC LEARNING LABORATORIES (2)

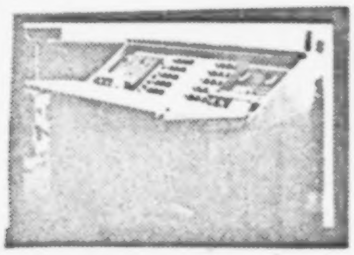
(155) Audio Teaching Center



(156) Audio Teaching Center

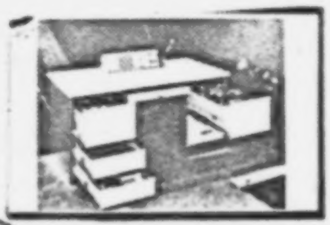
(157) Audiotronics

(158) Audiotronics

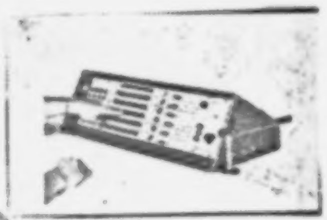


(159) AV Electronics

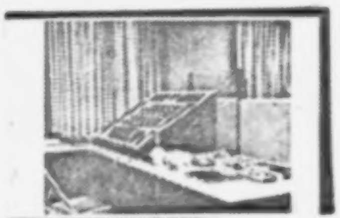
(160) AV Electronics



(161) Berlant

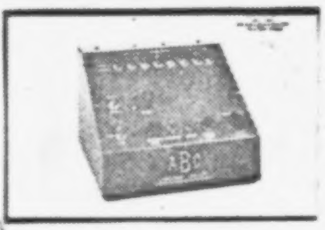


(162) Berlant



(163) Bernco

(164) Bernco



(165) Blacktronics

(166) Blacktronics

ELECTRONIC LEARNING LABORATORIES (3)

(167) Chester

(168) Chester

(169) Chester

( ) ~~Chester~~

( ) ~~Chester~~

(170) Cook

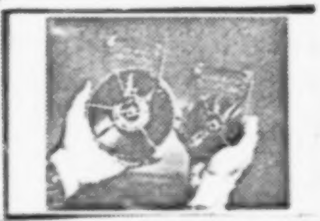
( ) ~~Cook~~

(171) Cousino

(172) Cousino

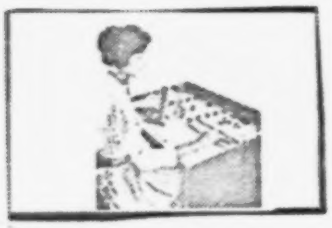
(173) Cousino

(174) Cousino


(175) Cousino

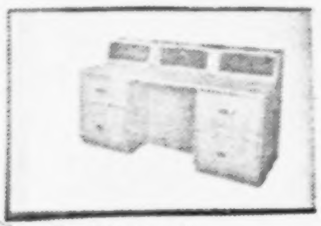
(176) Cousino

ELECTRONIC LEARNING LABORATORIES (4)

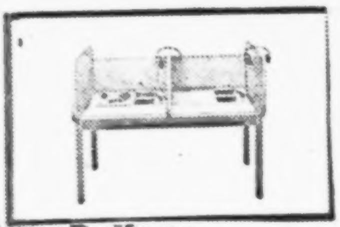


(177) Dictaphone

(178) Dictaphone



(179) DuKanek



(180) DuKane

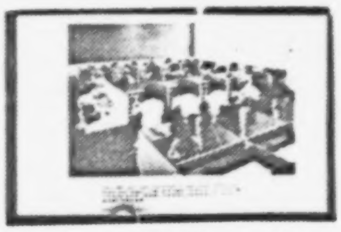
~~( ) Dukane~~

(181) Duodesk

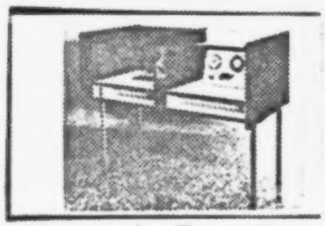
LATER

(190) ~~Educational~~ Teaching Labs
Electronic

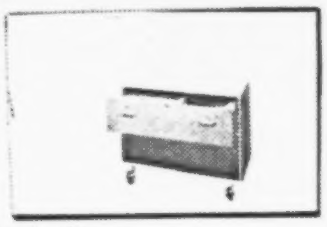
(191) ~~Educational~~ Teaching Labs
Electronic



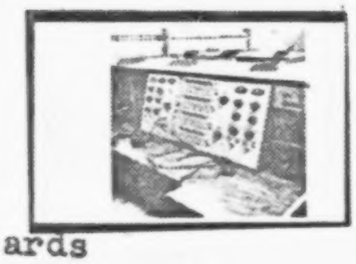
(192) Educational Teaching Labs
Electronic



(193) ~~Educational~~ Teaching Labs
Electronic



(182) Edutronics



(183) Edwards

ELECTRONIC TEACHING LABORATORIES (5)

(184) Edwards

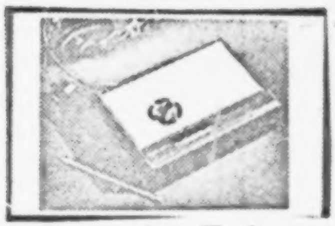
(185) Edwards

Send for

(186) Electro Educational
Developments

Send for

(187) Electro Educational
Developments


(188) Electronic Futures

(189) Electronic Futures

Send for

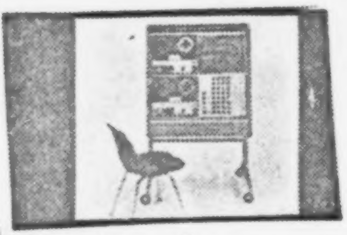
(194) Emco

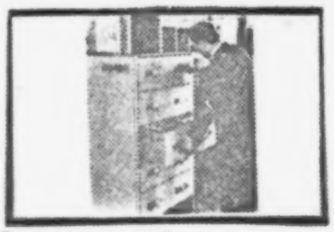
Send for

(195) Emco

Pic File

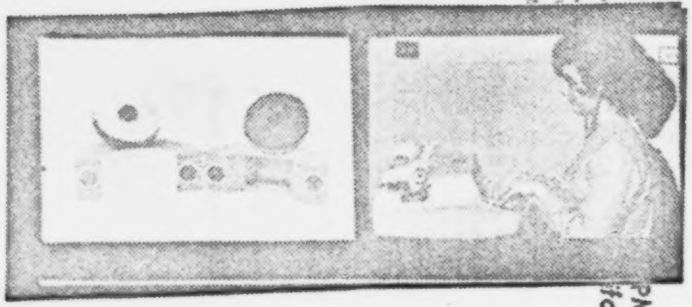
~~(196) Fleetwood~~


(197) Fleetwood


(198) Fleetwood

(199) Fleetwood

TEC
Univ
Scho
924
Los



PMENT PROJECT
fornia Facility

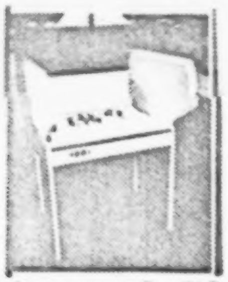
Hargan
or
Inductophone?
— check file

ELECTRONIC LEARNING LABORATORIES (6)

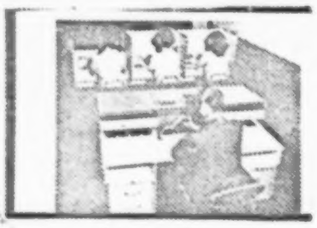
(200) Fleetwood

(201) Geloso

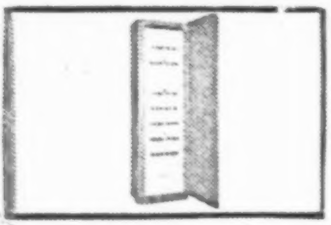
(202) General Electric



(203) General Electric

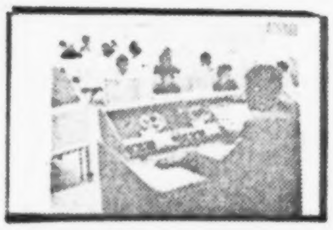


(204) ~~General Electronic~~ Control
~~Control~~



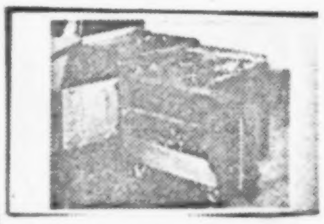
(205) ~~General Electronic
Control~~

Electro Solid Controls Inc.



(206) Hamilton

(207) Hamilton

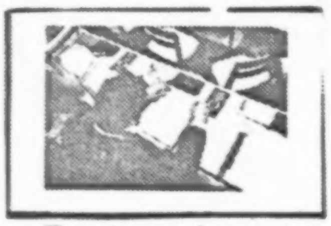


(208) Hoover

(209) Howe

209a ✓
Inductophone
Pic File

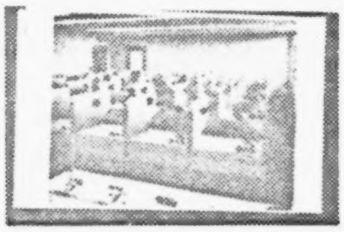
(210) Instructomatic



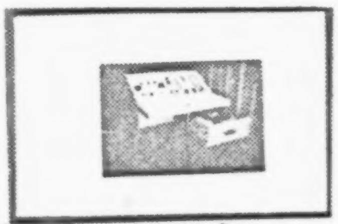
(211) Instructomatic

ELECTRONIC LEARNING LABORATORIES (7)

(212) Jay Electronics

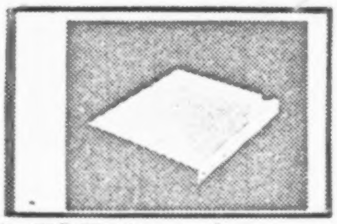


(213) Jentzen Miller

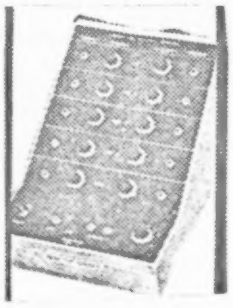


(214) KRS Electronics

(215) KRS Electronics



(216) KRS Electronics

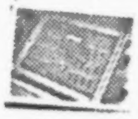


(217) Langua Lab

(218) Langua Lab

(219) Magnasync

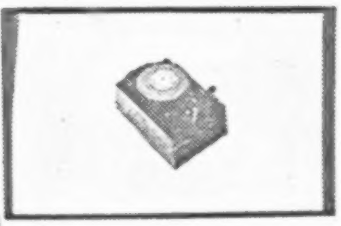
(220) R. C. Merchant



(221) R.C. Merchant

(222) R.C. Merchant

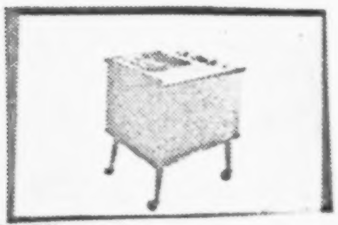
(223) Miller



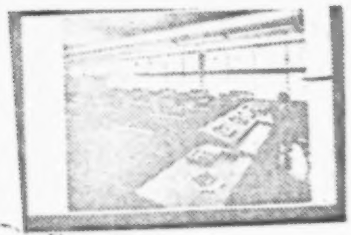
(224) Newcomb

ELECTRONIC LEARNING LABORATORIES (8)

(225) Perry Co

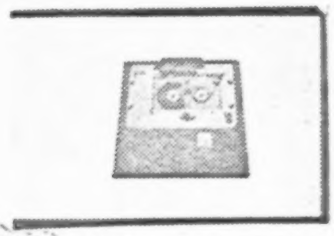


(226) RCA

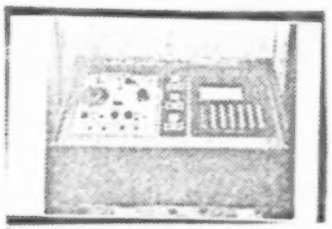


(227) RCA

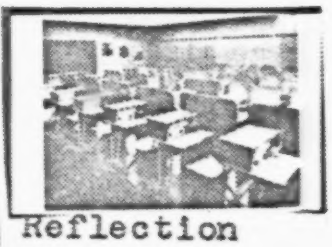
(228) RCA



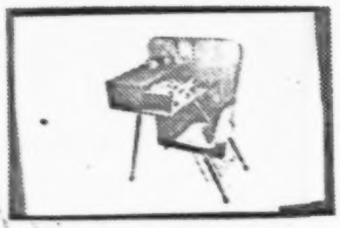
(229) RCA



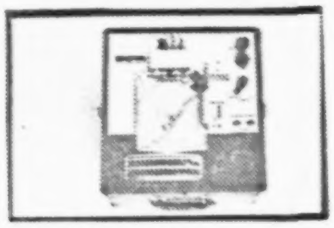
(230) Reflection



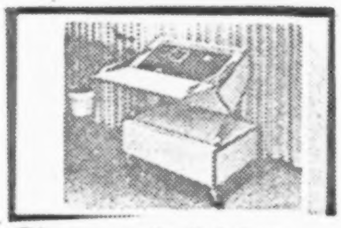
(231) Reflection



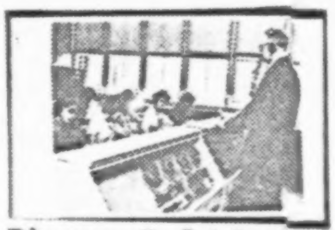
(232) Reflection



(233) Reflection



(234) Rheem Califone



(235) Rheem Califone

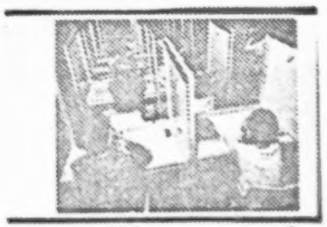
(236) Rheem Califone

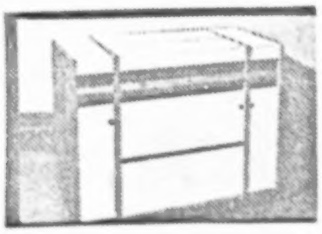
ELECTRONIC LEARNING LABORATORIES (9)

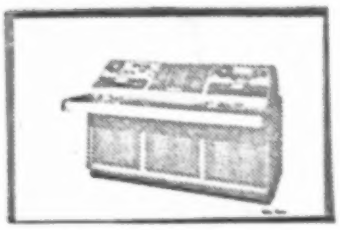
~~Robert H. Redfield~~

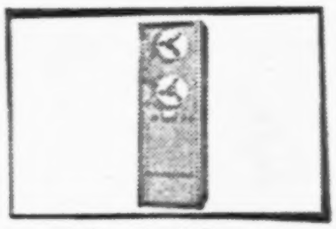
~~Robert H. Redfield~~

(237) Science Electronics


(238) Science Electronics


239 Sigma

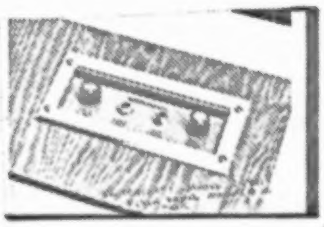

(240) Stancil Hoffman


(241) Stancil Hoffman

242 Switchcraft

(243) Switchcraft

(244) Switchcraft


(245) Switchcraft

TANBERG

Send for

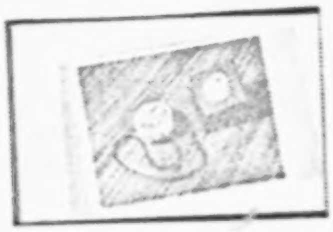
(246) Telectro

ELECTRONIC LEARNING LABORATORIES (10)

Send for

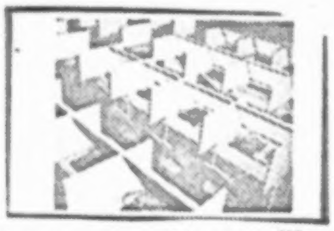
(247) Telectro

(248) Teleprompter



(249) Television Associates of Indiana

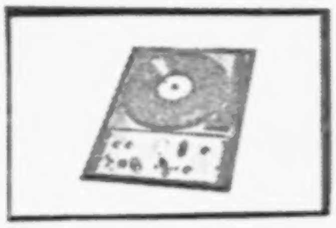
(250) Thompson Ramo Wooldridge



(251) Thompson Ramo Wooldridge

(252) Thomson Ramo Wooldridge

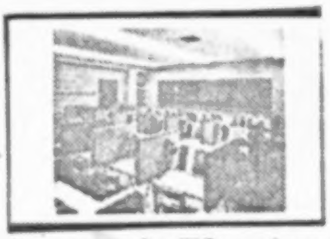
(253) Thompson Ramo Wooldridge



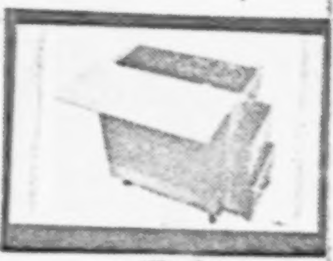
(254) Thompson Ramo Wooldridge

(255) Universal Electronic Labs

(256) Universal Electronic Labs



(257) Universal Electronic Labs



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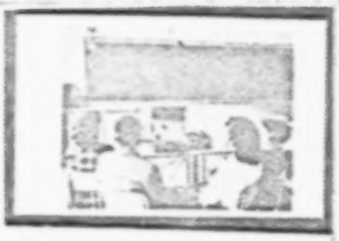
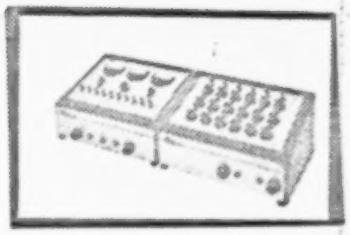
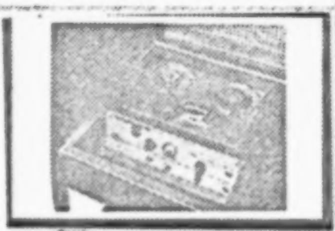
U.TRONICS 259 260

258

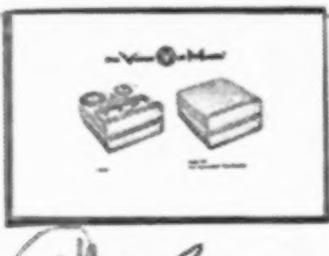


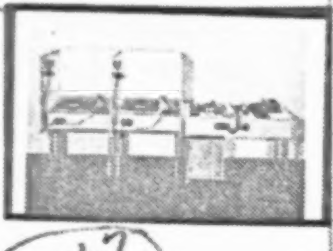
261 VIEWLEX 262



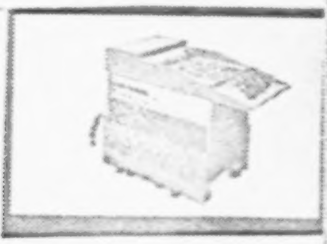


263 VIKING OF 264 MINNEAPOLIS



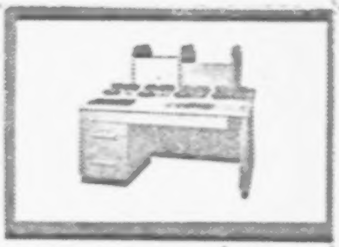


265 VOICE OF 266 MUSIC 267



268 WEBSTER ELECTRIC 269

270 WEBCOR 271 272



273 WEBSTER 274

?

275 WEST DEMSTER

ELECTRONIC LEARNING LABORATORIES (11)

258 ( ) Utronics

(259) Utronics

(260) Utronics

(261) Viewlex

(262) Viewlex

263 Viking of Minneapolis

(264) Viking of Minneapolis

(265) Voice of Music

(266) Voice of Music

(267) Voice of Music

(268) Webcor

(269) Webcor

ELECTRONIC LEARNING LABORATORIES (12)

(270) Webcpr

(271) Webster

(272) Webster

(273) Webster

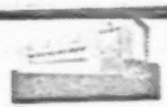
(274) Webster

275 West Dempster

TRAILER LABS

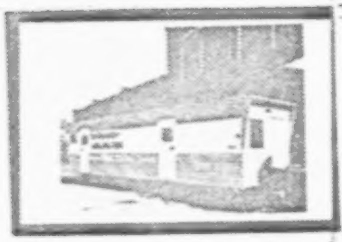
EDWARDS
ROLLORAMA — Send or Photo Brochure.

276



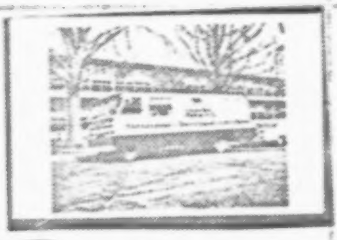
RHEEM

277



SCIENCE ELECTRONICS

278



THOMPSON RAMO WOOLDRIDGE

279

MAGNETIC TAPE CARTRIDGES

	Continuous Loop Attachment (fits any recorder)	Continuous Loop Cartridge (for specific brand of recorder)	Reel-to-reel type Cartridge
Cousino	X	X	
Geloso			
Jay Electronics		X	
KRS Electronics		X	
Langua Lab			X
Mowhawk Business Machines			
Pentron		X	
Reflection		X	
Science Electronics			X
Television Associates	X		
Thompson Ramo Wooldridge (Magneticon)			X
Teleprompter (Conley)		X	

Table 16

cartridges have been developed, including those by Fleetwood (198), KRS (215) and Science Electronics (257).

C. 1963-1970: A LOOK INTO THE FUTURE

Many of the present trends can be expected to continue: miniaturization of equipment and the use of transistors, modular construction, cartridge loading, wireless operation, use of rechargeable batteries, etc. There are also some additional trends which seem worthy of note here.

1. Random Access.

The dial in language lab suggests the possibility of centralized control of the mechanical and electronic functions so that several classrooms could be supplied from a single source. It is important to be able to tune in, not just to an individual program or tape, but to a particular portion of that program or tape. Gates Radio (203) has developed a unit for military use where small segments of tape each contain a particular set of instructions or part of the total program, so that any particular 90-second segment of sound information can be called up at will,

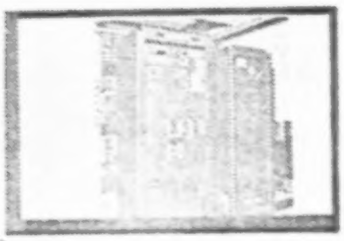


Fig. 28 Random Access Sound Synthesiser. Messages which fall into definite formats, but with different names and figures, can be synthesised from a series of tapes. This unit is used for announcing flight arrivals and departures. (McKenzie)

Fig. 282 Message Selector. The particular message is designated by number. After selection on the circukar switches it is ~~punched~~ entered into the sound synthesiser swhon above. (MacKenzie)

25a - add into page 25

a-2

The New York Stock Exchange has recently aquired a computerized sound synthesiser to supply up to the minute information on stock prices ~~on a dial in telephone system~~ from any dial telephone in the continental United States. The system was developed by the Teleregister Corporation.

a-1 The Fel-a-dex units used for directory purposes at airports, museums, and public buildings are random access sound units where several inquiry stations can be connected to a single tape unit. They can also be adapted to answer telephone inquiries.

and if necessary synchronized with a specific piece of visual information. Such a unit might be used to break down a conventional program into segments. ~~or as a dial in control unit containing specific instructions.~~ Access could be through a dial-in control unit. For example, a newcomer to the electronic learning laboratory could simply dial "0" for instructions in the use of the laboratory equipment so that it would not be necessary for either the teacher or the various tapes to repeat this instruction for every new student. He could then dial the required lessons as ~~he was~~ required.

Another type of random access unit has been developed by Mackenzie (28) which can put together any number of messages from a series of programed tape segments. It is presently used to program announcements at airline terminals where hundreds of different times, flight numbers, and airlines require a variety of announcement types in the course of a single day.

25A

How this applies to education is difficult to visualize, except as a kind of teaching machine ~~developing~~ generating a particular program or response for a student with a particular kind of problem.

25B

2. Stereophonic Sound. The impact of stereo on the home market suggests that it will ~~eventually and~~ inevitably find a place in education. Certainly musical appreciation classes will eventually

25b - add into p. 25

[illegible]. Sound Compression. The development of computerized sound synthesisers has mad possible yet another breakthrough - time compression of sound information. Speeding up a tape recorder is not a satisfactory means of compressing time since intelligibility is rapidly lost. Stopping the recorder automatically during pauses does achieve some useful gains. The major breakthrough has been made by IBM where a computer analyses the voice syllables and re-synthesises the words, allowing the time of ~~listing~~ listening to a lecture to be reduced to one half or less and still maintain acceptable intelligibility. This development is still highly experimental, but suggests that in the future sound will be more easily analysed, stored, synthesised, and subjected to time compression than was previously possible.

~~be~~ replac~~ing~~e their monaural equipment with the stereophonic variety, or at least with equipment which is compatable with stereophonic recordings. Whether stereo will ever invade the electronic learning laboratory and for what purpose is difficult to visualize ~~determine~~, but the capability is there to be used if required. Perhaps there will be a greater emphasis in training listening skills in the future, just as reading skills are taught at the present time, and for this instruction stereophonic sound might be highly advantageous. ~~an essential~~.

3. Telephone Amplifiers and Recorders.

Although the telephone is one of the oldest sound media ~~at our disposal~~, it has been the least used for direct education. With the aid of telephone amplifiers and recorders it is now possible ~~to use telephone communication as a means of allowing~~ to for classes in different parts of the country to share experiences, or to conduct panels and debates. It is also ~~would also be~~ feasible for groups of schools to have two-way communication with well known figures in literature, science, and politics, as with the writer of their textbook, or with the local Congressmen. ~~Member~~. Such developments remain for future experimentation and promotion. Several demonstrations of this technique have been made in recent years, but the cost of telephone lines makes it feasible for schools only when operated over short distances.

Sound Reproducing, Recording, and Transmission Equipment

Direct Transmission - one way

(a) Line
    Public Address System

(b) Broadcast
    Radio Receiver
    (Television Receiver)

Two way communication

(a) Intercom
    Telephone — Telephone amplifiers

(b) Radiophone

Playback equipment

(a) Record Player - regular, microgroove (stereo), auto-changer

(b) Tape Recorder ($\frac{1}{4}$") - 7 1/2. 3 3/4. 1 7/8ips: 1,2,4-track

fidelity
cartridge load
remote operation
random access
electrical synchronization (with picture)
multi-track for language lab applications
transistors and miniaturization

Recorder-reproducer equipment

Tape Recorder MAGNETIC CARD
(Videotape Recorder)
(dictation machines)
Telephone recorders

Two-channel or Multiplex

stereo
(television)(voice-picture)

Microphones, Speakers, and Earphones

Voice Synthesiser 1. McKenzie
2 Bell.

Standards - compatability
Preparation of Programs

Electronic Learning
~~LANGUAGE~~ LABORATORIES

Audio Passive

- disc
- tape
- tape cartridge
- continuous cartridge

Audio-active

- reflective sound devices
- call light
- intercom

Individual Recording
- single channel (one program)
- multi channel (several simultaneous programs)
- c/f lab with lectnne technique
- teacher recorder
- individual student recorders
- automated multiple track recorder

Electronic Features
- transistors - overcome power, heat, size, and weight problems
- modular units for easy maintainance

Portable vs Permanent installations

- wheel carts
- wireless and battery operated
- desk modules
- booths with sound absorbers

The Visual Complement

- group presentation devices
  - motion picture
  - slide
  - overhead
- individual viewing devices
- individual sound viewing devices

LANGUAGE LABORATORIES

✓ The Advance Products Co., Inc.
2300 East Douglas Ave.
P.O. Box 2178
Wichita 1, Kans.

on
The Acoustran Corporation
San Jacinto Bldg.
Houston 2, Texas

✓ Aero Service Corporation (Division of Litton Industries)
210 East Courtland St.
Philadelphia 20, Pa.

American Concertone — see American Electronics

✓ American Desk Manufacturing Co.
Temple, Texas

✓ American Electronics, Inc.
American Concertone Division
9449 W. Jefferson Blvd.
Culver City, Calif.

American Geloso Electronics, Inc.
251 Park Avenue South
New York 10, N.Y.

✓ American Seating
Electronic Learning Center
Grand Rapids 2, Mich.

~~Amerline Corporation~~
~~2727 West Chicago Ave.~~
~~Chicago 22, Ill.~~

~~Audio-Master Corporation~~
~~17 East 45th St.~~
~~New York 17, N.Y.~~

✓ Audio Teaching Center
137 Hamilton St.
New Haven. Conn.

✓ Audiotronics Corporation
11057 Weddington St.
P.O. Box 151
North Hollywood, Calif.

✓ AV Electronics, Inc.
1315 Van Ness
Fresno 21, Calif.

Bell & Howell Photo Sales Co.
7100 McCormick Rd.
Chicago 45, Ill.

Bausch & Lomb, Inc
79164 Bausch St
Rochester 2, N.Y.

✓ Berlant Automonitor Corporation
8525 Steller Dr.
Culver City. Calif.

✓ Bernco Engineering Corporation
2320 South Tibbs Ave.
Indianapolis 41, Ind.

Black-Tronics, Inc.
4731 Cedros
Sherman Oaks, Calif.

Brunswick Corp.
2605 E. Kilgore Rd.
Kalamazoo, Mich.

Camera Equipment Co., Inc.
315 W. 43rd St.
New York 36, N.Y.

Chester Electronics Laboratories
Chester, Conn.

Clevite Electronic Components
232 Forbes Rd.
Bedford, Ohio ✓

Cook Electric Company
2700 Southport Ave.
Chicago 14, Ill.
~~(see also Robert H. Redfield)~~

Cousino Electronics Corporation
1941 Franklin Ave.
Toledo 2, Ohio

Dictaphone Corporation
730 Third Ave.
New York 17, N.Y.

or

~~Dictaphone Corporation~~
~~2224 W. Olympic Blvd.~~
~~Los Angeles 6, Calif.~~

DuKane Corporation
St. Charles, Ill.

DuoDesk, Inc.
Upland Lane
Armonk, N.Y.

~~Educational Communications Systems, Inc.~~
~~12 Franklin Ave.~~
~~Clinton, N.Y.~~

Edu-Tronics, Inc.
459 Broadway
Hicksville, N.Y.

Edwards Company, Inc.
Educational Equipment Division
Norwalk, Conn.

Electro-Educational Development, Inc.
1033 Soo Line Bldg.
Minneapolis, Minn.

Electronic Futures, Inc.
301 State St.
North Haven, Conn.

Electronic Teaching Laboratories
5034 Wisconsin Ave., N.W.
Washington 16, D.C.

Electro-Solid Controls, Inc.
8001 Bloomington Freeway
Minneapolis 20, Minn.

E~~Y~~mco, Inc. (Emco)
413 L. Street, N.W.
Washington, D.C.

Fleetwood Furniture Co.
Zeeland, Mich.

Gates Radio Company
Quincy, Ill.

~~Gamma Scientific~~
~~257 Grant Ave.~~
~~Cliffside Park, N.J.~~

~~GBC America Corp.~~
~~315 West 43rd St.~~
~~New York 36, N.Y.~~

~~General Electric Co.~~
~~Command Systems Division~~
~~212 W. Division St.~~
~~Syracuse, N.Y.~~

Geloso Electronics See American Geloso

General Electric Co.
Educational Technology and
Products Project
212 W. Division St.
Syracuse, N.Y.

General Electronic Control, Inc. See Electro-Solid Control, Inc.
~~Minneapolis 20, Minn.~~

General Electronic Laboratories, Inc. - see Science-Electronics, Inc.

Gray Manufacturing Co
16 Arbor St
Hartford, Conn.

Hamilton Manufacturing Co.
Two Rivers, Wisc.

Har-Gan Company
623 Middlefield Rd.
Palo Alto, Calif.

Hoover Brothers, Inc.
1305 No. 14th St.
Temple, Texas

Howe Folding Furniture, Inc.
360 Lexington Ave.
New York 17, N.Y.

Inductophone Products
4304 Harmon Rd.
Richmond 11, Calif.

Language Labs.

Instructomatic, Inc.
8310 Fenkell Ave.
Detroit, Mich.

International Commodities Inc
285 S Los Robles Ave
Pasadena, Calif.

Jay Electronics
65-37 Fresh Meadow Lane
Flushing, N.Y.

Jentzen-Miller Co.
585 Stephenson Highway
Troy, Mich.

KRS Electronics
4035 Transport St.
Palo Alto, Calif.

Langua Lab., Inc.
167 Chestnut St.
Albany 10, N.Y.

Lingua Trainer - see Science-Electronics, Inc.

~~Language Research, Inc.~~
~~13 Kirkland St.~~
~~Cambridge 38, Mass.~~

Litton Industries - see Aero Service Corp.

MacKenzie Electronics
1025 N. McCadden Pl.
Hollywood 38, Calif.

Magnasync Corporation
5546 Satsuma Ave.
North Hollywood, Calif.

Magneticon - see Thompson Ramo Wooldridge

Medallion - see DuKane

Robert C. Merchant Co.
P.O. Box 594
West Lafayette, Ind.

Robert N. Redfield, see Cook Electric Co.

Miller Manufacturing Co.
3310 East Roxboro Rd., N.E.
Atlanta 5, Ga.

Minnesota Mining - see Revere

Mobile Tronics - see Aero Service Corp.

Newcomb Audio Products Co.
6824 Lexington Ave.
Hollywood 38, Calif.

Pentron Sales Co.
777 South Tripp Ave.
Chicago 24, Ill.

?

The Perry Co.
P.O. Box 7187
Waco, Texas

✓

Plastic Mold and Engineering Co.
Box 4255
East Providence, R.I.

Ralke Co Inc
849 N. Highland
Hollywood, Calif.

Radio Corporation of America
Bldg. 15-5
Camden 2, N.J.

~~Reflection Educational Products~~
~~1564 Miramonte Ave.~~
~~Los Altos, Calif.~~

Robert H. Redfield - (see Cook Electronic Co.)

Reflection Educational Products
735 Stierlin Rd.
Mountain View, Calif.

Rheem Califone Corporation
1020 North La Brea
Hollywood 38, Calif.

Revere Camera Co
2501 Hudson Rd.
St Paul 19, Minn

~~Rheem Califone Corporation~~
~~5922 Bowcroft St.~~
~~Los Angeles 16, Calif.~~
Robert H. Redfield See Cook Electronic

Science-Electronics Inc.
195 Massachusetts Ave.
Cambridge 39, Mass.

Sigma Electric Co., Inc.
23 East 16th St.
New York 3, N.Y.

Stancil Hoffmann
845 North Highland
Los Angeles 38, Calif.

Switchcraft Inc.
5555 North Elston Ave.
Chicago 30, Ill.

Tanberg of America, Inc.
8 Third Ave,
Pelham, N.Y.

Tel-a-Dex — see International Commodities Inc

Telectro Corp.
35-16 37th St.
Long Island City 1, N.Y.

~~Teaching Aids, Inc.~~
~~P.O. Box 3527~~
~~Long Beach 3, Calif.~~

Television Associates of Indiana, Inc.
East Barker Ave.
Michigan City, Ind.

Teleprompter
50 W 44th St
New York 36, N.Y.

Thompson Ramo Wooldridge, Inc.
Educational Electronic Division
532 Sylvan Ave.
Englewood Cliffs, N.J.

The Troy-Beaumont Co., Inc.
50 Central Park
New York 23, N.Y.

Universal Electronics Laboratories
510 Hudson St.
Hackensack, N.J.

Utronics, Inc.
12 Franklin Ave.
Clinton, N.Y.

Viewlex
Veterans Memorial Hwy
Holbrook, L.I., N.Y.

Viking of Minneapolis, Inc.
9600 Aldrich Ave.
Minneapolis 20, Minn.

Voice of Music V-M see VM

V-M Corporation
P.O. Box 659
Benton Harbor, Mich.

Webcor Sales Company
5610 W. Bloomingdale Ave.
Chicago 39, Ill.

Webster Electric Company
1900 Clark St.
Racine, Wisc.

V.

EDUCATIONAL TELEVISION

A. INTRODUCTION

Just as sound can be transformed into electrical impulses and transmitted along wires or through the air, visual phemomena can be similarly transmitted. The television camera scans the image line by line, and the receiver assembles these lines to re-form the original pattern. Thirty complete images are transmitted every second to give the illusion of motion and reality.

Television is a relative newcomer to the educational arena, and its remarkable growth in its first ten years is in no small measure due to the interest and support of the Office of Education, the Fund for the Advancement of Education, and the Ford Foundation. Television has already had an enormous impact on American home life, and is having a lesser but significant impact on the schools. By combining the availability and ease of transmission of radio with the imagery of motion pictures, it promises to be a highly significant educational tool.

A. Pubpose.

Television is a means of rapidly disseminating sound and picture information or real life events, and ~~of~~ recordings. Educational television , for the purposes of this monograph, includes the use of television in schools, colleges, and training institutions to assist in teaching and learning. Specific areas of utilization include direct teaching, supplemental teaching, enrichment, and observation.

a. Direct Teaching. Where teachers for a particular subject are in short supply, television allows the available teaching talent to be shared by a larger number of classes. Direct teaching with television is usually an emergency measure since trained teachers are needed in the classroom to help solve individual learning problems. It is also being used to "educate the masses" with programs such as "Continental Classroom" and "Sunrise Semester."

b. Supplemental Teaching. This is usually associated with team teaching concepts, where the core of the lesson is presented by the television teacher to large classes, which then break into small groups for discussion and review. This arrangement allows very efficient utilization of teacher talent. ~~since~~ The television teacher is usually a person with exceptional teaching skills, who is ~~also~~ given ~~more~~ ~~the~~ time ~~and the~~ and assistance in preparation that would not ~~than would~~ be possible for a regular classroom teacher. In turn, the classroom teachers are less concerned with transmitting content, and spend more of their time ~~in~~ interacting with the students in small groups~~, or~~ and helping with individual problems.

C. Enrighment. Where television programs are instructive but not directly related to the curriculum they are classified as enrichment. These would include events which are happening now such as on the spot news reports, ~~or~~ a speech from the President, a television ~~or planned experiences such as~~ a visit to a factory or museum, or meeting with some eminent scientist or philosopher. Many ~~of the~~ news and documentary ~~type~~ programs on commercial television would fall into this category.

d. Observation. Some teacher training institutions use closed circuit television to study the classroom in action. The trainee teachers view a class under the guidance of an instructor, and discuss the techniques employed. This method allows larger groups of observers than could be accomodated in the classroom, and facilitates discussion of events as they occur.

Television is a useful tool for magnifying events so that all members of a class can simultaneously view pictures and demonstrations that might otherwise be visible to only a few students. It allows film transmission from a central film chain, and potentially could be used to call up information from the library. Television is also useful to monitor behavior in the playground, lunch areas, or anywhere supervision is needed and personnel are not readily available.

2 History.

The first system for transmitting pictures by wire was demonstrated by a Scotsman, Alexander Bain, in 1842. Even before the introduction of electronic amplifiers a practical system was developed for commercial use. Phototelegraphy using telephone lines was initiated in 1908, radio ~~telegraphy~~ transmission in 1921, and general business use began about 1938.

Television is a logical development of phototelegraphy. Baird in England and Jenkins in the United States demonstrated crude television transmission in 1923, and an improved method including half-tones in 1925. Mechanical scanning was replaced by electronic scanning in 1936, and in 1941 the first U.S. Television license was granted. Color television was first demonstrated by Baird in 1928, but ~~it was not until 1954 that~~ color television was not introduced commercially until 1954 because of the need to make it compatible with black and white receivers.

Commercial development of television began at the end of World War II, becoming almost explosive in the early 1950's. It was in this period that educational television had its beginnings.

II. TRENDS AND DEVELOPMENTS SINCE 1955.

For practical purposes, educational television (ETV) may be said to have begun about 1955, and many of its patterns of operation have been model~~l~~ed ~~on~~ after commercial operations, but with scaled down equipment and budgets. ~~Also,~~ education uses both broadcast and closed circuit transmission ~~less often,~~ since ~~a~~ small operations can be run more economically using transmission by wire. ~~or~~ ~~called~~ ~~closed circuit television.~~

1. Closed Circuit Television.

Television signals transmitted by co-axial cable or microwave link can be received only by ~~by~~ schools which are a part of the network, and are in effect private transmission systems. The simplest closed circuit arrangement is a camera directly connected to a receiver for demonstration within a classroom. The complexisty of the system increases as the program is shared between classrooms, between schools, and between school systems. All levels of operation exist, and the following discussion will consider single camera, multiple camera, and studio type operations.

a. Single Camera - Teacher Controlled. A television camera permanently set up on the teacher's desk can be used to enlarge pictures and quotes from books, to magnify tiny objects, to ~~or~~ view through the microscope (Fig. 23), and to show manipulative tasks which would ordinarily be visible to only a few students at a time. (Fig. 28) Television gives the teacher greater control over what is being viewed by the student, and allows demonstrations to be performed for much larger groups. ~~than would otherwise be practical~~. The size of the class can be enlarged by increasing the number of receivers, so that lecture-demonstrations can be performed in an auditorium, or extended to other rooms as desired. Hence, it is possible to start off with a very modest closed circuit operation and let it grow.

b. Single Camera - Independent Control. Where television is used for observation purposes the camera is permanently located in a part corner of the room where it is not too conspicuous, and controlled ~~from the~~ remotely. ~~viewing position.~~ In some instances the viewer may have control over ~~focus~~,

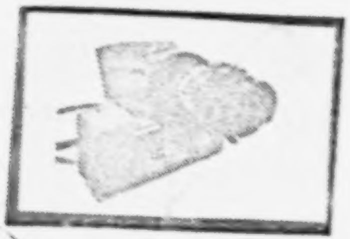


Fig. [illegible] Automatic Pan-tilt Movement and Zoom Lens. The field of view can be selected remotely. The direction is chosen by panning and tilting; the angle of vision by zooming the lens in or out. (Kintel) camera angle through the use of ~~remotely controlled~~ "pan~~ning~~" and "tilt~~ing~~" ~~of the~~ controls camera, (Fig. 28) with a "zoom" lens to facilitate "moving in closer." Set-ups of this type may be used to monitor student behavior in experimental classrooms, to allow trainee teachers to observe teachers at work, ~~teaching techniques,~~ and in some instances, for television teaching.

C. Multiple Camera - Teacher Controlled. When a television demonstration is viewed in the room of origin, the teacher, gestures, and blackboard display are visible to supplement the television content. For remote viewing, a second camera is needed so that this additional information can be relayed to the viewers in other rooms, and the teacher can switch from camera to camera to direct the students' interest and attention. A more elaborate set-up might use an automatic pan-tilt and zoom to give the teacher still further control over the field of view. By the time this degree of complexity is reached, the technical manipulation begins to interfere with the teaching process, and a second person is needed to operate the equipment so that the teacher

Fig. Classroom Studio.

The lesson is monitored and edited within the classroom during an actual class session. Some teachers prefer this arrangement so that they can have direct feedback from the students. (General Precision)

286a CLOSED CIRCUIT

In this instance the program is monitored [illegible] outside of the studio.

can concentrate on the presentation aspects of the lesson.

d. The Classroom-Studio. The next step is to add a console with a monitor for each television camera. ~~with~~ A an operator selects the images and ~~to~~ switch to different cameras as the lesson requires. The console could be at the back of the classroom, or in a separate area. ~~depending on the scale of operation.~~ see The classroom-studios should be considered as transitional between classroom and studio operation. Few classrooms are designed either visually or acoustically for use as television studios, nor do~~es~~ ~~it~~ they have the necessary lighting, power supply ceiling height, or air conditioning. ~~needed for full studio operation.~~ Rather than convert a classroom, it is ~~often~~ preferable to build a special room insulated from extraneous sounds, with controlled lighting and acoustics and adequate space to move cameras around. This also enables special wiring for power, sound, and video-signals. The ~~added~~ equipment needed for a classroom-studio is essentially the same as for a full studio operation.

Fig.287 ETV Studio, Anaheim, Calif. View from the control room of a television lesson during transmission. (Singler)

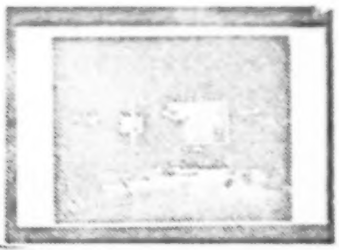


Fig.288 ~~Michigan State ETV Studio.~~ Trainee teachers ~~may~~ assist in the production of programs. ~~for schools AND for public information.~~ (GPL)

Connecticut State Teachers College originates courses such as Art Appreciation & Psychology ~~for~~ on closed circuit.

e. The ETV Studio. In a full studio operation it is usual to have human operators on each camera to maximize control control and flexibility. In this way the viewer always sees things from the preferred viewing angle. Good television lessons require careful planning and co-ordination, involving team teaching techniques to co-ordinate the television lesson with teachers in the individual classrooms. Normally, the production team consists of a curriculum expert, graphic artist, director, and the television teacher working in conjunction with a technical crew -- cameramen, electricians, and technical director. Obviously some amount of scripting and rehearsal are required. The problem is not as simple as piping the lesson from one classroom to several others. In a large scale operation summer workshops might be needed to coordinate the efforts of classroom and television teachers, with machinery to provide classroom teachers with outlines of the television lesson together with materials and lesson plans.

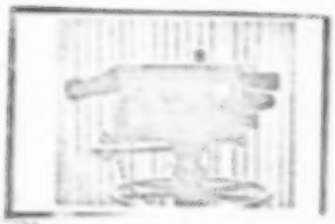


Fig. 19 Marconi Camera. For ~~broadcasting purposes~~ commercial broadcasting larger and more flexible cameras are used. The requirements - and the budget - of the educator are somewhat more modest.

Further discussion of methodology would not be appropriate here since several excellent books already exist for this purpose.[42] The discussion so far is intended to assist in defining the equipment requirements for the various kinds of closed cirsuit operation.

2. Broadcast ETV.

From the point of view of program preparation ~~presentation~~, broadcast television is essentially similar to studio-type closed circuit operations. From a production standpoint there are added complexities to insure a smooth technical presentation and optimum image quality. Costly image orthicon cameras replace the vidicons while ~~used in closed-circuit operation~~. Third and fourth cameras may be ~~are~~ added, with stand-bys in event of emergencies. Elaborate lighting with dimmer controls, ~~smooth~~ camera dollies and cranes, and an enlarged technical team facilitate presentations of theatrical quality. The educator and ETV are not concerned

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Lewis, Philip
Cassirer,

footnotes for P. 10

[1] Cassirer, H.R. Television Teaching Today. Paris: Imprimerie Jouve for UNESCO, 1960. (U.S. Distributor, New York: Columbia University Press.)

[2] Lewis, Philip. Educational Television Guidebook. New York: McGraw Hill Book Company, Inc., 1961.

with theatrical presentations, but with content and the communication of ideas, which can be transmitted ~~by~~ very adequately by simple equipment in the medium price range.

a. Broadcast ETV Networks. Where programs are recorded, they can be re-used, shared, or exchanged with other stations, as with commercial television networks. It is for this purpose that the National ~~Tex~~ Educational Television (NET) network was founded, and some exchange activities are also negotiated through the National Association of Educational Broadcasters (NAEB). A gift from the Fund for the Advancement of Education recently provided all ETV stations with video tape recorders, and a few large CCTV installations such as Hagerstown, Md. ~~also~~ have recorders also. Most of the tapes available for distribution are converted into 16mm kinescopes since most schools and television operations have 16mm projectors at their disposal, while ~~very~~ relatively few have video tape playbacks.

Besides exchange of programs and distribution of kinescopes, other means have been developed for extending the range of the television signal, including low-power translators, community antenna systems, and airborne television.

b. Low-Power Translators. Where geographic barriers such as a mountain range seriously affect the reception of a television signal, a translator located on a mountain top may ~~be used to~~ amplify the signal and rebroadcast it at a different frequency (Fig. 20). Usually the translator should have a line of sight view of both the station's transmitting aerial, and ~~of~~ the area to be served by the translated signal. Some of the companies supplying this equipment are listed on page ____ of the directory.

c. Community Antenna Television. Small communities nested in valleys or in the shadow of the television signal may benefit from Community Antenna Television (CATV). A single aerial in a favored location receives the signal and transmits it by wire to homes and schools subscribing to the service. This is ~~proving to be a very~~ an economic means of providing a good television signal where topographical, geographical, or technological reasons would otherwise prevent ~~good~~ reception.

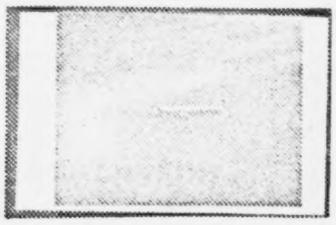


Fig. 29 Air based ETV transmitter. Parts of five mid western states are covered by a single transmitter in the MPATI experiment. It is still a point of controversy whether the airborne transmitter is more economical than a series of ground based transmitters. (Westinghouse)

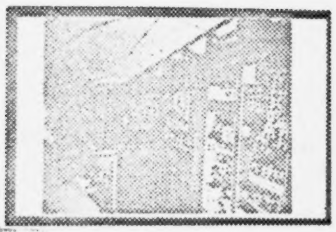


Fig. 292 Transmission equipment used for MPATI experiment. The video tape machine (center) plays back the program. (Westinghouse)

A list of suppliers and communities already receiving this service is available through the National Community Television Association. ✗

d. Midwest Program on Airborne Television Instruction (MPATI

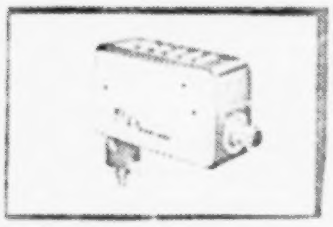
Another means of extending the range of the television signal is to set up the broadcasting aerial at a great height and away from geographical obstructions. The MPATI experiment ~~is~~ us~~ing~~es an airplane flying at a height of 25,000 feet over ~~Purdue~~ Lafayette, Indiana, to cover an area 400 miles in diameter, including parts of five states. Figure 291 shows the plane used as a transmitting aerial, while Figure 292 shows the videotape and transmitting equipment inside the aircraft. This system was developed by Westinghouse for MPATI, and is capable of broadcasting four programs simultaneously.

3. Television Equipment.

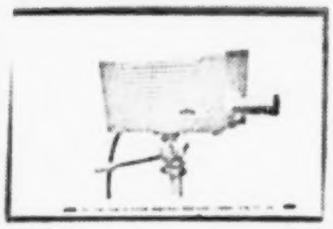
This section will briefly summarise the available cameras, receivers, consoles, projectors, ~~and~~ recorders, ~~and~~ and ~~some~~ sundry items of specialised equipment, including classroom response units, ~~and~~ and Phonoscope.

~~1. Vidicon Cameras for Closed Circuit Operation. A~~

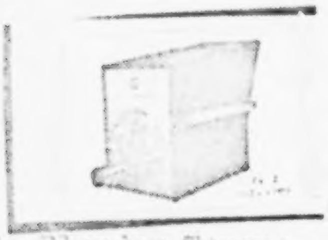
VIDICON TELEVISION CAMERAS



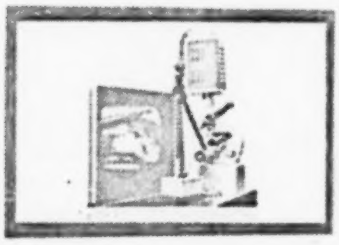
([illegible]) Blonder Tongue



(299) DuMont



(294) Blonder Tongue



(300) DuMont

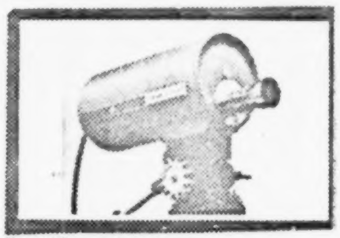
(295) Camera Equipment Co.

(301) ~~EMI/US~~ Electro Megadyne Inc

(296) Dage

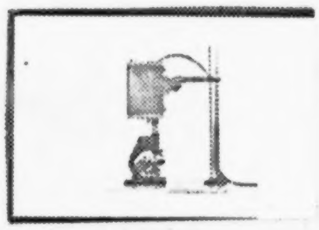
(302) Fairbanks Morse

(297) Diamond



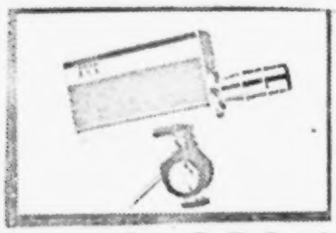
(303) General Electric

(298) Diamond



(304) General Precision

VIDICON TELEVISION CAMERAS (2)

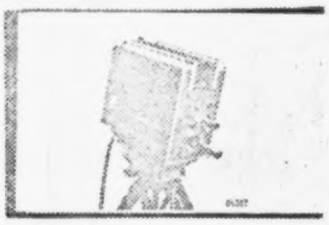


(305) International Telephone
& Telegraph

(306) Industrial Television
& Microwave

(307) Kintel

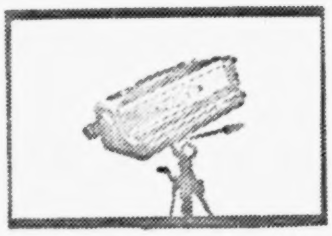
(308) Packard Bell



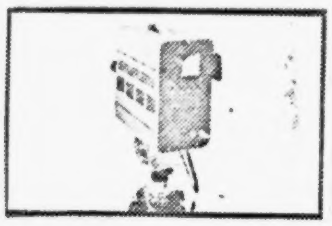
(309) Radio Corporation of America

(310) Sarkes Tarzian

(311) Siegler



(312) Space Communications



(313) Sylvania

a. Vidicon Cameras for Closed Circuit Operation.

A wide range of vidicon cameras are now available for educational use, and vary from very simple units capable of producing a picture if connected to the aerial terminals of a conventional receiver, to full studio type equipment. Many of the cameras are built with the viewfinder as a separate module, so that in instances where a viewfinder is not required it can be dispensed with. Since all vidicon cameras accomplish essentially the same function, there will be no comparative description here. Difference in price usually reflects the quality of construction, design, and performance of the equipment.

Suppliers include Blonder Tongue (293 and 294), Camera Equipment Co. (295), Dage (296), Diamond (297 and 298), DuMont (299), EMI/US (301), Fairbanks Morse (302), General Electric (303), General Precision (304), International Telephone and Telegraph (305), Industrial Television (306), Kintel (307), Motorola, Packard Bell (308), Radio Corporation of America (309), Sarkes Tarzian (310), Space Communications (312), Siegler (311), Sylvania (313).

Several companies have classroom demonstration units for mounting on the teacher's desk, including DuMont (300), Packard Bell (308), Space Communications (312), and Sylvania (313). Since almost any television camera can be mounted on a stand for this type of operation this list should be considered as representative only. Video Engineering (314) have integrated the television camera into a special wheel-away console which includes provision for use with slides and motion pictures and overhead transparencies as well as for demonstrations, quotes from books, etc. A video-monitor is included, and there is a built-in public address system for auditorium use.

Remote pan, tilt, zoom, and focusing mechanisms are manufactured by several companies, and most are interchangeable for the various cameras. The same is true for mixing consoles to facilitate switching between cameras.

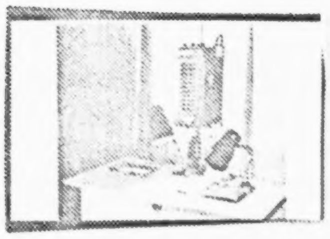


Fig. (314) Camera set up for multiple usage including demonstration of small objects and manipulative tasks. The same desk has facilities for t transmitting overhead transparencies, slides, filmstrips, and motion pictures, and includes its own TV monitor and public address system. (Video Engineering)

~~Telephone and Telegraph ( ), Kintel ( ), Lear Siegler ( ), and Radio Corporation of America( ).~~

b. Television Receivers. Potentially, any receiver designed for broadcast reception could be used for either closed circuit or broadcast ETV. Because school use presents special requirements, a number of companies are building special receivers for the educational market, and a number ~~have been~~ are singled out for discussion here. Since new companies are periodically launching into this ~~new~~ market, the~~s~~ list ~~given here~~ should be regarded as incomplete.

A large viewing screen is preferred for classroom use so that, wherever possible, a single receiver will ~~serve~~ supply the needs of an average class group. A 23-inch screen will serve ~~the needs of~~ for almost twice the number of students who can adequately view a 17-inch screen. A front speaker at least 8 inches in diameter is desirable for good intelligibility, ~~and at least an 8 inch speaker is dexxxxxxx needed.~~ The screen should be protected by safety glass or plastic so that students will not suffer injury in the event of an accident, Also

TELEVISION RECEIVERS FOR CLASSROOM USE (1)

(316) Admiral

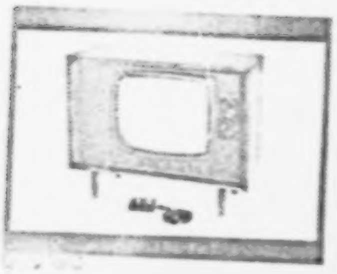
316a ARGUS

(317) American Television & Radio

(318) Blonder Tongue

?

(319) Conrac



(320) [illegible]

(321) General Electric

(322) General Precision

322a KINTEL

~~(323) Hoffman~~

(324) Magnavox

(325) Miratel

(326) Motorola

326a MAGNAVOX

326b MIRATEL

(327) Packard Bell

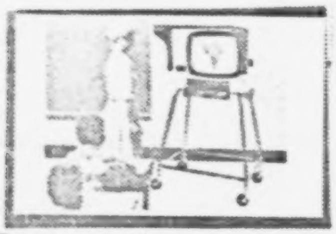
TELEVISION RECEIVERS FOR CLASSROOM USE (2)

(328) Radio Corporation of America

328a Satchell Carlson

(329) Spacé Communications

(330) Sylvania



(331) Transvision

(332) Westinghouse

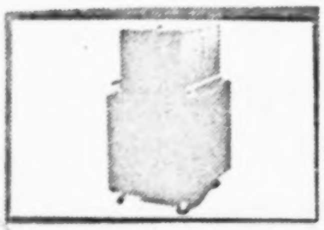
(333) Zenith

The screen should have some anti-reflection coating to reduce glare from windows, ceiling lights, and other strong sources of illumination. Some kind of hood may be needed in some instances. It should also be possible to mount the television receiver at a height where all students have an unobstructed view, and a tilting device may be needed to set the receiver at the optimum viewing angle. Receivers for classroom use are marketed by ADMIRAL (316) ATR (317), Blonder Tongue (318), Conrac (319), (320) ~~Craftsman (—)~~, ~~DuMont (—)~~, ~~Diamond (—)~~, ~~HOFFMAN (323)~~ General Electric (321), General Precision (322), ~~International Telephone and Telegraph (—)~~, Magnavox (324), Miratel (325), Motorola (326 Packard Bell (327), Radio Corporation of America (328), Space Communications (329), Sylvania (330), Transvision (331), Westinghouse (33 and Zenith (332).

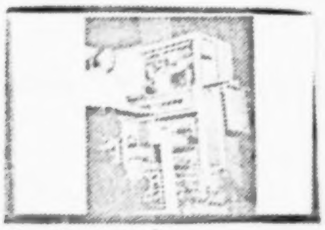
C. Television Projectors. So called "theatre television" uses television projectors in preference to multiple television receivers, and some schools are ~~now~~ considering such projectors for auditorium use. Electronically they are similar to conventional receivers, but use an

TELEVISION PROJECTORS

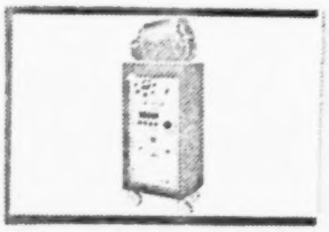
(334) Blonder Tongue



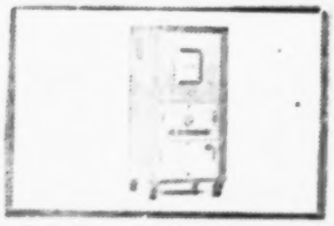
(335) Closed Circuit TV Corp.



(336) General Electric



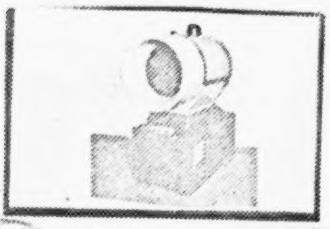
(337) General Precision



(338) General Television Network

(339) Norelco

(340) Teleprompter



(341) Waltham

efficient mirror system to project ~~focus~~ the image onto a screen. Television projectors are available through BLONDER TONGUE (334), Closed Circuit Corp. Dalto (335), General Electric (336), General Precision (337), General Television Network (338), Norelco (339), ~~Televeam (—)~~, Teleprompter (340), and Waltham (341).

d. Television Recorders. Video tape and kinescopes are the principle methods of recording television programs. The kinescope process requires special equipment and skills to obtain satisfactory results, and is not usually used by ETV studios. The ease of recording sound and picture on magnetic tape makes this a preferable medium for educational use since it needs no processing, and quality can be closely controlled at the time of recording by immediate playback from of~~f~~ the tape. Also, magnetic tape can be erased and re-used.

Video tape was originally developed for use in commercial television, so that the recorders ~~initial modds were built~~ to broadcast specifications. More recently some simpler units have been introduced for educational use which are lower in price, have reduced tape speed, and in some instances, a

VIDEO/TAPE RECORDERS

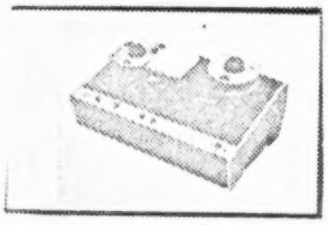
	Tape Width				Intended Use		
	2 inch tape	1 inch tape	½ inch tape	¼ inch tape	broadcast	educational	home
Ampex	X				X	X	
Cinescopes			X			X	
Precision Instrument Co.		X				X	
Radio Corp. (RCA)	X			X	X	X	X*
Sony		X				X	

* not in production

VIDEO TAPE RECORDERS

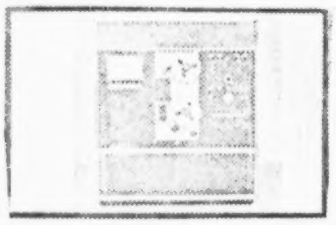
(342) Ampex - broadcast model

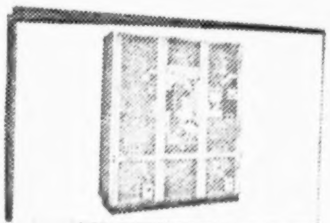
(343) Ampex - closed circuit model

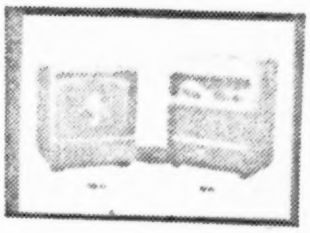

(344) Ampex - portable model

(345) Cinescopes

(346) Precision Instrument Co.


(347) RCA - Broadcast Model


(348) RCA - Educational model


(349) Sony

Westinghouse Slow-Scan System ?

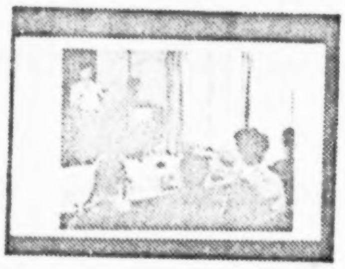


Fig. 359 Measuring Student ResponseS.

Shows the early Corrigan ~~response~~ units being used to evaluate student progress by responding to multiple choice questions. presented via Television.

narrower gauge tape. Educational recorders are manufactured by Ampex (342, 343, and 344), Cinescopes (345), Precision Instrument (346), Radio Corporation of America (348), and Sony (349).

e Two-Way Communication. Many criticisms of television teaching are based on the inability of the student to communicate with the television teacher, or of the teacher to receive immediate feedback as to how the students are responding. Community Engineering Corp. (349a) has a sound intercommunication system for closed circuit installations so that children in remote classrooms can ask questions of the television teacher. The Corrigan Teletest system now available from Educational Teaching Labs (350) is a key-response device which allows the classroom teacher, and even the television teacher, to constantly evaluate the proficiency of learning by asking multiple choice questions. Diamond Electronics (448) has a special television lab, for pretesting all kinds of teaching programs using separate booths with individual television receivers, and a response mechanism by which results can be recorded.

Some non-technological methods of obtaining feedback should also be mentioned here. Students who want credit for watching the "Continental Classroom" and similar programs can enroll at local colleges or universities which provide Saturday seminars and terminal examinations to fulfill the feedback function. In small closed circuit operations, television transmits most of the lesson information, and the teacher travels to meet with many of the classes for discussion and tutorial help. Despite the arguments pro and con, it should be borne in mind that television is primarily a means of transmitting information, and wherever possible some means of feedback should be provided.

A rather unusual form of two-way communication has been developed by Phonoscope (351, 352, and 353) which has not only two-way

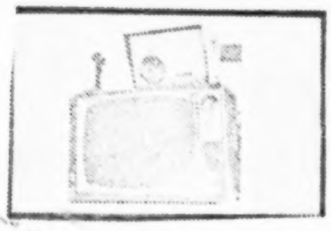


Fig. 351 Phonoscope camera and reweiver. Each classroom has its own camera-receiver unit for two way telegision communication

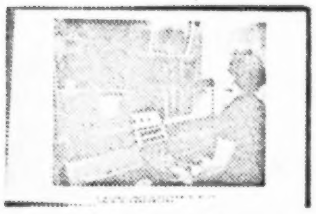


Fig. 352 Switching Phonoscope lessons. Inputs from all cameras are fed to a central switching and distribution point. In this way conversations can take place between the television teacher and class members, or even between students in the various classes.

Fig. [illegible] One of the experimental Phonoscope classrooms at Galveston Texas.

sound, but two-way picture. Each classroom in the Phonoscope system has a camera and microphone mounted on top of the television receiver. This allows the TV instructor to see the visual reactions of the students, while in classroom periods class members in the different schools can see and ask questions of one another. A central switching point allows the person speaking to be seen by viewers in the various schools. At present the Phonoscope principle is used only for small closed circuit installations, but it has exciting potentialities for allowing city children to share ideas and experiences with country children, and for meeting with persons not able to visit the individual classrooms.

f. Color Television. As simpler color equipment is designed, it is not impossible that color television might find its way into the schools. It is already widely used by schools of medicine. Color cameras are supplied by Fairbanks Morse and Electra Megadyne Inc. (EMI), Norelco, and Radio Corp. Color television receivers are available through Fairbanks Morse, General Electric, Norelco, Radio Corp., and Zenith.

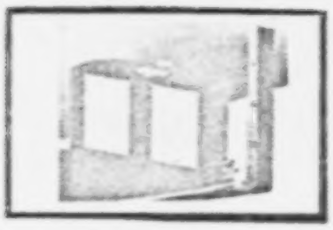


Fig. 354 Prism lens attqchment permits any television camera to receive a stereoscopic view. (Stereotronics)

Fig. 355 Library television. Information can be called up from remote storage by a push button selector. Plans and drawings can be magnified and cented by means of the joy stick control in picture center. (General Precision)

PIC
FILE

Fig. 356 Push button selector for library television. A telephone dial could also be used. (General Precision)

Fig. 357 A cameraless television transmitter used for storage and distribution of signatures in banks. (~~Transvision~~) Television Utilities

g. Three-Dimensional Television. Industrial needs have already demanded the development of three-dimensional television systems, but its value in education has yet to be demonstrated. Stereotronics (354) provides attachments for camera lens and viewing screen which enable viewing in the three-dimensional mode.

h. Library Television. Modern information systems use television to distribute information from a central file. In banks it is used for rapid random access to signatures (357), while library documents can likewise be transmitted for immediate viewing. General Precision (355, 356) has a remote-controlled zoom on their library unit to allow the user to magnify sections of a document (such as a blueprint)for examination. A number of the computerized information systems to be discussed in Chapter on Computers use television displays to read out information.

i. Special Equipment. Image Instruments and

23A - insert into p. 23

These systems will find use in library television for retaining images received from the central file. They also have potential application in slow scan television - a means of transmitting images ~~[illegible]~~ on regular telephone circuits. In this way teaching machines such as Plato and Socrates (see chapter on Teaching Machines p.   ) could extend their influence beyond the college campus, and library materials could likewise be available to the homebound student. With automated systems it also permits access around the clock if this is considered desirable.

23b - add into p. 23

It would be easy to overlook the great range of equipment needed for televison transmission and reception, including micro-wave links, antennas, matching and distribution systems, translators, community antenna systems, and so on. These systems are manufactured by a very large group of companies including such well known names as Adler, Ameco, Collins Radio, Community Engineering, Daniels, Entron, Jampro, and Spencer Kennedy.

Fig. 358 Jerrold Jacks. Each piece of equipment has its own special jack which plugs into any outlet in the central communication cortex, and allows a whole series of different circuits to be multiplexed on a single co-axial cable.

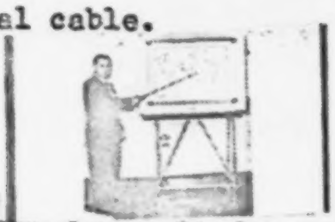


Fig. 359 Display unit for use on ETV. (Educational Television Aids)

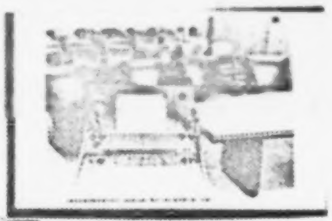


Fig. 360 Teleprompter scroll mounted in desk. Speed of the roll is regulated by a hand control.

Fig. 361 A portable prompting device. (Telit)

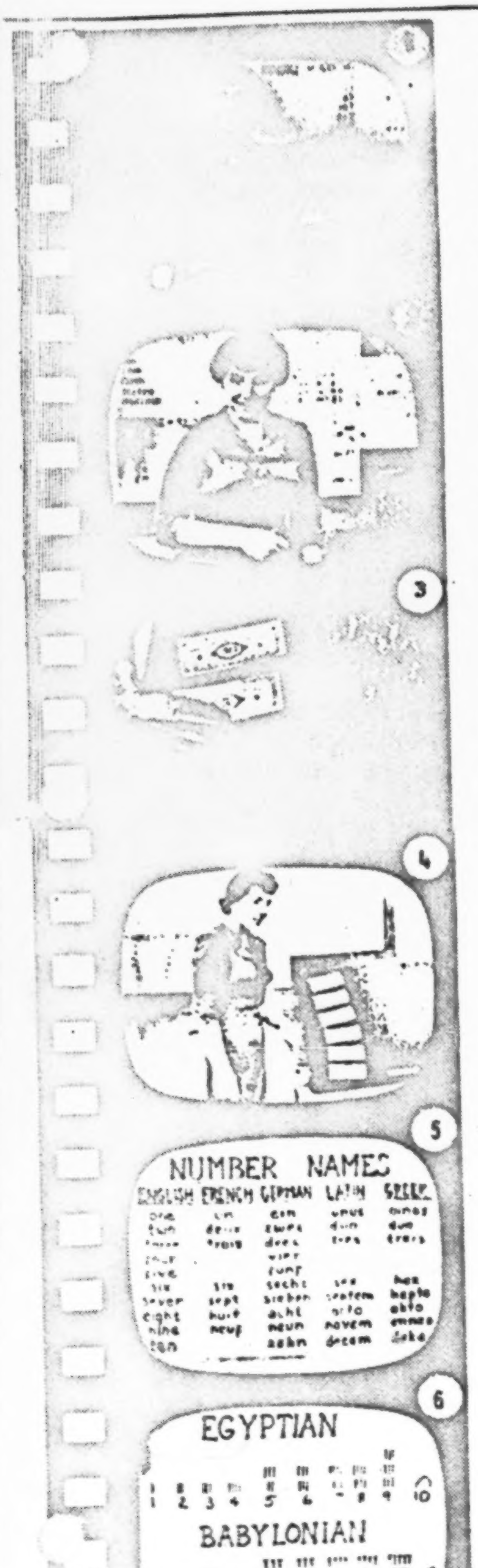
Fig. 362 Prompting device mounted on camera (U.S. tele-Service Corp.)

Westinghouse ( ) have special equipment for "freezing" ~~a~~ ~~single~~ television images for closer examination. 23A Hughes ~~( )~~ ha~~ve~~s a direct view storage (television) tube which may accomplish the same function. Jerrold (358) ha~~ve~~s developed a system of connectors which enables a single co-axial cable to become a complete communication cortex through the use of special jacks or plugs. Thus, television signals can be fed in or received at any outlet in the building, and it is possible to multiplex television, telephone, and language lab~~s~~ programs all on the same cable. Each piece of equipment ~~has~~ requires its own special jack to match it into the system.

23b. Prompters of various kinds have been used ~~for~~ by commercial television since its inception, and the automated printed rolls supplied by Teleprompter (360) and U.S. Tele-Service Corp. (362) are commonly seen in broadcast studios. A smaller and less costly unit for public speakers and small television studios is now available through Telit (361).

~~Two~~ ~~One~~ company is now in business to make transcriptions

Fig. (56) Photo-Script Sample
(U.S. Tele-Service Corp.).



(1) ANNOUNCER: A course in mathematics for the fourth grade, taught by Dorothy Rom.

MISS ROM: Hi, it's good seeing you again.

(2) Are we ready to figure out the denominations of the bills? Remember, a man had six bills which totaled up to 63 dollars. None of them were one dollar bills.

(3) Now he has one fifty dollar bill, one five dollar bill ...

(4) and four two dollar bills. So he has 50, 55, 57, 59, 61, 63 dollars. Did you forget about these two dollar bills? Actually they're not seen too much, but they still are in circulation.

Keep a pencil handy and I'll have another puzzle for you after the end of the program.

Today we're going to review some of the things which we have learned during these past lessons. And then we're going to extend the understanding of our number system through the millions.

If you have tried to imagine what our world would be like if no one ever learned to use numbers, I think you would have come to the realization that everything about us just wouldn't exist. There are things that wouldn't have been conceived of if people hadn't learned to calculate with numbers.

(5) Remember, it took a long time for people to learn to use numbers. First they used number names. We saw how similar these number names were to each other. And since these were the first words used by the early people many later words also grew out of these number names. But as people becamse more civilized and they had to have books, they had to keep books, keep records of their possessions, they had to have symbols with which to calculate. So they developed systems of enumeration.

(6) And we see the Egyptian system of enumeration where they use a vertical stroke, they keep adding on those vertical strokes until they come to ten. The Babylonians did the same. They also used a symbol of vertical strokes and introduced a new symbol at ten. We say, they said they used the base of ten in counting.

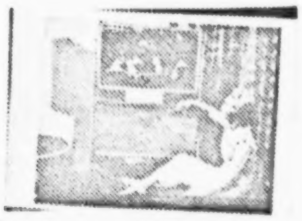


Fig. 364 Future TV Receiver. It is speculated that flat ~~wall~~ screens or wall panels will be possible within ten years. (RCA)

Fig. 365 Designers Dream. A portable television receiver ne larger than a cigar box. (RCA)

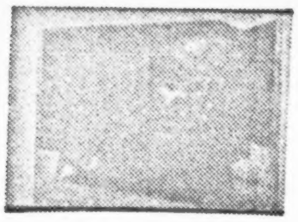


Fig. 366 A laboratory prototype. A home video tape recorder as part of the television receiver is under development at the Savid Sarnoff Research Laboratories in New Jersey. It uses regular ¼ inch tape and is almost as simple to operate as a tape recorder for sound. (RCA)

?

+ U.S. Tele Service

of broadcast television programs. ~~Telescript~~ (363) transcribes it into verbal text with a series of pictures alongside photographed from the tube at five second intervals (Fig.)

ADD TELCAN + WESTINGHOUSE SLOW SCAN TV.

C. 1963-1970: A LOOK INTO THE FUTURE

Miniaturization and simplification of equipment, less expensive video tape recorders, and increasing use of color would be a logical forecast for the next ten years. RCA anticipates the advent of flat viewing tubes ~~by this time~~ (Fig. 364), along with ~~and the advent of~~ portable color receivers smaller than a lady's handbag (Fig. 365).

Probably the most spectacular innovation ~~development~~ in the schools will be ~~the development of new means of achieving~~ two-way communication with the television teacher, and the advent of a television link between ~~the~~ classroom and ~~the~~ library. In many schools films and slides will be distributed from a central film chain, and television receivers will become permanent rather than portable installations.

Automated library and teaching machine facilities might well be among the most significant new uses for education. These in turn would change the conventional administrative patterns of schools and colleges and make it unnecessary to centralize learning within a certqin group of buildings. For the moment this is mere speculation, but q great new potential is here to be unleased as the educator sees fit.

TV for direct teaching
supplemental teaching (team teach
enrichment
obaervation (as in teacher trainin

TELEVISION

1. Closed Circuit Television

Single camera - teacher controlled

(a) within the classroom for microscope diplays, etc.
(b) for sharing demonstrations with other classes
Single Camera - independently controlled - for observation purposes
Multiple Camera - Teacher controlled

(a) automatic zoom and tilt
(b) teachers console
(c) control equipment

Multiple camera - independently controlled

(a) studio type operations for live programs
(b) TV distribution systems - for film and videotape
(c) TV distribution systems - for banks and library informati
(d) Multiplexing
Television for intercommunication - Phonoscope

Feedback to Master Teacher - CECO

Television receivers for classroom use

(a) size and technical specifications
(b) tilting, light hoods, etc. ~~color~~
Television Projectors ~~color~~
Cameras - orthicon
vidicon
~~color~~
Color TV
compatible and non-compatible systems - tech. spec.
transistors and miniaturization
TV Recorders — VTR — TPR — NCR
TV DISTRIBUTION METHODS AND EQUIPMENT

CLosed circuit co-axial cable
microwave
Jerrold concepts (multiplexing)
Braodcast UHF
VHF
low power translators
CATV & Multiplexing
MPATI
(Networks, team teahing, curricula, etc.)
see later for
Individual Instruction - Teletest, Plato, Class
Printed transcripts of programs

EDUCATIONAL TELEVISION

✓ Adler Electronics, Inc.
One Le Fevre Lane
New Rochelle, New York

Admiral Corp
3800 Cortland St
Chicago 47, Illinois

AMECO Corp.
2949 West Osborn Road
Phoenix 17, Arizona

✓ American Television and Radio Co.
300 East Fourth Street
St. Paul 1, Minn.

✓ Ampex Video Products Co.
Box 3000.
Redwood City, Calif.

~~Ampex Corp.~~
~~934 Charter Street~~
~~Redwood City, Calif.~~

✓ Argus - See
Sylvania Home and Commercial Electronics Corp.
~~730 3rd Ave.~~
~~New York,~~ 13, ~~New York~~

✓ Bell Television
552 W. 53rd Street
New York 19, New York

✓ Blonder Tongue Laboratories
9 Alling Street
Newark, New Jersey

Camera Equipment Co
315 W 43rd St
New York 36. N.Y.

✓ Cinescopes Products Co.
P.O. Box 8403 Crenshaw Street
Los Angeles 8, Calif.

✓ Closed Circuit Corporation of America
5397 Poplar Blvd.
Los Angeles 32, Calif.

✓ Cohu Electronics Inc. see Kintel Division
~~Kin-Tel Division~~
~~5725 Kearney Villa Road~~
~~San Diego 12, Calif.~~

Collins Radio Co.
1200 N. Alma Road
Richardson, Texas

C-COR Electronics Inc
~~Community Engineering Corp.~~
234 E. College Ave.
State College, Penn.

✓ Conrac Division
Giannini Controls Corp.
Glendora, Calif. — Cornberg, Sol and Associate
see Space Communication corporation

✓ Dage TV see
~~Division of~~ Thompson Ramo-Wooldgidge, Inc.
~~204 Hindry~~ Ave.
Inglewood, ~~Calif~~.

✓ Dalto Electronics Corp. — see Teleprompter
Oad Street
~~Norwood, New Jersey~~

Daniels and Associates, Inc.
2930 East Thirs Ave.
Denver 6, Colo.

✓ Diamond Electronics
P.O. Box 415
Lancaster, Ohio

✓ ~~Allen B.~~ DuMont Laboratories
750 Bloomfield Ave.
Clifton, New Jersey

Educational Television Aids
111 Hampton Road West
Williamsport, Md.

✓ E. M. I./ U.S. ~~see [illegible]~~ — Electra Megadyne, Inc
~~1750 Vine~~
~~Los Angeles, Calif~~ · 13259 Sherman Wa
North Hollywood, Cali
~~1750 North Vine~~
~~Los Angeles, 28 Calif.~~ ✓

~~Entron, Inc.~~
~~2141 Industrial Parkway~~
~~Silver Spring, Md.~~

✓ Entron, Inc.
4902 Lawrence Street
Box 287
Bladensburg, Md.

✓ Eugene Singer Laboratories, See
~~Division of~~ Closed Circuit Corp.
~~5397 Poplar Blvd.~~
~~Los Angeles, 32, Calif.~~

✓ Fairbanks-Morse Co.
Electronic Division
505 Oakwood West
Hartford, Conn.

Fleetwood - see Conrac

✓ Foto Video Electronics, Inc. - see Diamond Electronics
~~P.O. Box 415~~
~~Lancaster, Ohio~~

✓ Gates Radio Co.
Quincy, Ill.

General Dynamics E[illegible]phics
1400 N. Goodman Street
Rochester 3, New York

✓ General Electric
Electronics Park
Syracuse 1, New York

✓ General Precision, GPL Division
63 Bedford Road
Pleasantville, New York

✓ General Television Network
901 Livernois Ave.
Ferndale 20, Mich.

Giantview - see
General Television Network

Hallamore Electronics Div See Siegler Corp.

Hoffman Electronics Corp.
3761 S. Hill,
Los Angeles

✓ Image Instruments, Inc.
2300 Washington Street
Newton Lower Falls 62, Mass.

Industrial Products Division
International Telephone and Telegraph Corp.
15191 Bledsoe Street
San Fernando, Calif.

✓ Industrial Television
12828A Nutwood Street
Garden Grove, Calif.

✓ Industrial Television and Microwave
7270 Beverly Blvd.
Los Angeles 36, Calif.

✓ Intercontinental Electronics Corp.
300 Shames Drive
Westbury, New York

Jampro Antenna Co.
Sacramento, Calif.

✓ Jerrold Electronics Corp.
The Jerrold Bldg.
15th and Lehigh
Philadelphia 32, Pa.

✓ Kintel, a division of Cohu Electronics, Inc.
5725 Keary Villa Road
Box 623
San Diego, Calif.
Kearny

✓ Lear-Siegler see
The Siegler Corp.
~~714 N. Brookhurst Street~~
~~Anaheim, Calif.~~

✓ Ling - see
The Space Communications Corp.
~~1841 Broadway (at 60th Street)~~
~~New York 23, New York~~

✓ Magnavox Co.
Fort Wayne 4, Indiana

✓ Machtronics — see
Precision Instrument Co.
~~3170 Porter Drive~~
~~Palo Alto, Calif.~~

Marconi - see Ampex

Nord - see Television Utilities Corp.

✓ Miratel, Inc.
Richardson Street
New Brighton 12, Minn.

✓ Motorola Communications and Electronics, Inc.
4501 West Augusta Blvd,
Chicago 51, Ill.

National Community Television Assn, Inc.
535 Transportation Bldg.
Washington 6, D.C

✓ Norelco see
North American Philips Co, Inc.
~~100 East 42nd Street~~
~~New York 17, New York~~

✓ North American Philips Co., Inc.
100 East 42nd Street
New York 17, New York

✓ Packard Bell Electronics
1920 South Figuroa
Los Angeles 7, Calif.

Philco Corp.
4700 Wissahickon Ave.
Philadelphia, Pa.

✓ Philips - see
North American Philips
~~100 East 42nd Street~~
~~New York 17, New York~~

✓ Phonoscope, Inc.
625 Texas National Bank Bldg.
Houston 2, Texas

✓ Precision Instrument Co.
3170 Porter Drive
Palo Alto, Calif.

✓ Radio Corporation of America
Industrial Electronics Products
Camden 2, New Jersey

✓ Sarkes Tarzian, Inc.
E. Hillside Drive
Bloomington, Ind.

Setchell-Carlson Inc
New Brighton.
St Paul 12, Minn

✓ The Siegler Corp.
Hallamore Electronics Division
714 N. Brookhurst Street
Anaheim, Calif.

✓ Sony Corporation of America
580 Fifth Ave
New York 36, New York

✓ Space Communications Corp.
1841 Broadway (at 60th Street)
New York 23, New York

Spencer-Kennedy Laboratories, Inc. ✓
1320 Soldiers Field Road
Boston 35, Mass

✓ Stereotronics Corp.
1717 North Highland ~~Street~~ Ave
Los Angeles 28, Calif.

✓ Sylvania Home and Commercial Electronics Corp.
730 Third Ave.
New York 17, New York

Telcan — see Cinerama ?

✓ Telebeam, see
Waltham Precision Instrument Co.
~~Brookfield, Conn.~~

Tele-Measurements Incorporated
72 North Mitchell Ave.
Livingston, New Jersey

✓ Teleprompter Corp.
50 West 44th Street
New York 36, New York

✓ Telescript
155 West 72nd Street
New York 23, New York

✓ Television Utilities Corp.
342 West 40th Street
New York 18, New York

✓ Telit Industries, Inc.
226 South Wabash Ave.
Chicago 4, Ill.

✓ Thompson Ramo Wooldridge
Educational Electronics Division
532 Sylvan Ave.
Englewood Cliffs, New Jersey

✓ Transvision Electronics, Inc.
Yonkers, New York

✓ U.S. Tele-Service Corp.
369 Lexington Ave.
New York 17, New York

Video Color Corp.
729 Centinella Ave.
Inglewood, Calif.

✓ Video Engineering Co., Inc.
Riggs Road and First Place, N.E.
Washington 11, D.C.

✓ Waltham Precision Instrument Co.
Brookfield, Conn.

✓ Westinghouse Electric Corp.
~~3 Gateway Center~~
~~Box 2278~~
Pittsburg 30, Pa.
P.O. Box 10570
Pittsburgh 35, Pa

Write-a-Mile Inc
Educational Television Aids
~~111 Hampton Road West~~
~~Williamsport, Md.~~

✓ Zenith Sales Corp.
6001 Dickens Ave.
Chicago 39, Ill.